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International Registry of Poultry Genetic Stocks

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University of Connecticut - Storrs

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INTERNATIONAL REGISTRY OF POULTRY GENETIC STOCKS

A Directory of
Specialized Lines and Strains, Mutations, Breeds and Varieties of Chickens, Japanese Quail and Turkeys

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INTRODUCTION

It had been felt for many years by an increasing number of people that a listing or registry of the available genetic stocks of domestic fowl should be compiled and made available to all those who might have possible use for such information. Increasingly, a wide range of people, from biomedical researchers to backyard fanciers, had been inquiring as to the location and availability of various poultry stocks. In 1972, a "Registry of *Gallus Domesticus* Genetic Stocks in the United States" was published to fill this need for the domestic chicken. In 1975, an enlarged second edition, "Registry of Poultry Genetic Stocks in North America" was published. This second Registry included both the United States and Canada and its contents included genetic stocks of the chicken *(Gallus domesticus)*, Japanese quail *(Cotournix japonica)* and turkey *(Meleagris gallopavo)*. In 1978 with the addition of four new countries, a third edition, "Registry of Poultry Genetic Stocks" was published. In 1981 and again in 1984 fourth and fifth editions were published. These were entitled "International Registry of Poultry Genetic Stocks" as these editions included stocks from seventeen and twenty-one countries, respectively.

This new edition of the Registry has again been updated and it includes the chicken, Japanese quail, and turkey stocks of eighteen countries besides those of the United States. The stocks listed in the Registry are those which were submitted by breeders and suppliers listed in Part VII. Efforts were made to reach as many potential contributors as possible through both direct mailing and popular press appeal. This Registry will be updated again in three years, and it is hoped that new as well as present contributors will submit new data or updated information at any time for inclusion in the next edition.

The Registry is divided into six parts as follows:

Part I – Description and location of 217 chicken, 66 quail, and 14 turkey specialized lines and strains.

Part II – Inheritance, linkage, characterization, literature reference and locations of 171 chicken, 36 quail, and 22 turkey mutant traits.

Part III – Listing of chicken, quail, and turkey genetic traits, and gene symbols.

Part IV – Chicken, quail, and turkey chromosome linkage maps.

Part V – Description and location of 601 chicken, 6 quail, and 18 turkey breeds and varieties.

Part VI – Phenotypic descriptions and genotypic groupings of the chicken plumage color patterns.

Part VII – Breeder-supplier index, with 262 addresses, code numbers, and registry item numbers for cross reference.

ACKNOWLEDGMENTS

The author is deeply indebted to all those persons who have contributed to the listings in this Registry. Many of you have contributed to previous editions and I am grateful for your continued support and interest. Many are new contributors; I welcome your present support and hope that you will continue with us in future editions. I would also like to express my sincerest thanks to **Sanda Beaupre** for her expert secretarial assistance and to **Beth Clark** for her efforts in updating the records and computerizing the data, and finally to the members of the University of Connecticut Agricultural Publications Department for their technical and artistic assistance in the final preparation of the Registry.

FORWARD

Into life there comes a time when we must release a part of ourselves in order to make room for more of life's essence. All our knowledge is of no advantage to us unless we can put it to constructive use; not only for ourselves, but for others who desire it. Unless given wings, knowledge can be an obstruction to growth. Thus, the need to share was created and the lesson was shown that in the giving away of ourselves we continue to grow.

As a dominant gene always becomes apparent, this Registry has evidenced itself through this basic calling of life -- sharing. Many years of learning and experience are laid bare for all who desire to feast upon its contents. This is a banquet of love and joy prepared for all who have accepted this invitation offered within these pages. This is a book filled with many riches not only in the variety of poultry stocks described in their beautiful clarity, but those of the creator/editor's rewarding fulfillment in life as a poultry geneticist. The opportunity which this publication provides becomes the channel through which he shares with others the years of knowledge which he has gained.

Most important of all is that the Registry is a book made up of ***many*** people. It is solely built upon the hundreds of persons who have consented and contributed their stocks for listing. All the items; lines, traits, breeds and varieties described within these pages are there due only to the fact ***a contributor*** is available for their reference. Thus the Registry's very existence is nourished by those which are encompassed within its covers. The Registry is now celebrating its eighteenth year and sixth edition of this service.

This book is people -- people ready to serve you. They not only offer the knowledge prepared in these pages, they offer themselves. United in the common bond -- the joy experienced in working with poultry stocks -- they extend to you the fruits of their hobbies, their professions, their life's endeavors. This Registry is a living, present existence of hundreds of persons around the world, come together to assist you through these their contributions in the furthering of this cooperative venture in sharing.

"It is in the giving that we receive".

SOURCE CODING INDEX

Source code numbers of all stocks listed in Part I, Part V and some in Part II refer to the code numbers of the breeders or suppliers so numbered in Part VII. In Part II the source of some entries refers the reader to breeds or varieties listed in Part V that carry the trait and under which are listed the coded sources for the breed or variety.

Information as to availability of specific stocks is not included due to its unpredictable and ever-changing nature. **Listing of stocks does not imply that they are necessarily available.** Inquiries as to specific stock availability should be directed to the contributor listed as holding them.

COUNTRIES LISTED

Austria	Brazil	Canada	Czeckoslovakia
Denmark	Finland	France	Germany
Hungary	Japan	Netherlands	Norway
Poland	South Africa	Spain	Sweden
Switzerland	United Kingdom	United States	

This publication was supported in part by Grant #RR00529 from the Animal Resources Branch, National Institutes of Health, U.S. Public Health Service.

The University of Connecticut presents this Registry as a service to those interested in specific genetic stocks of domestic fowl. It makes no claims for the stocks listed herein, or their freedom from egg borne disease agents, nor does it recommend or endorse any breeder or supplier. In addition, it is not possible to guarantee the authenticity or scientific accuracy of information presented in this compilation. Those wishing to transport stocks between the United States and the foreign countries listed in this Registry are reminded that they must obtain custom forms and follow the procedures governing such shipments.

Available for $3.00 from:

Storrs Agricultural Experiment Station Publications
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Storrs, Connecticut 06268

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"Poultry living under our very roof, and, by the rapid succession of their generations, affording a sufficient number of instances for even the short life of man to give time to take some cognisance of their progressive succession -- poultry afford the best possible subjects for observing the transmission or interruption of hereditary forms and instincts."

Rev. Edmund Saul Dixon

I. SPECIALIZED LINES AND STRAINS

CHICKEN

(Gallus domesticus)

RANDOMBRED CONTROL STRAINS

1 ADSRI NEW HAMPSHIRE CONTROL STRAINS
CHARACT: An egg-type control population obtained from the University of Pretoria in 1976. Has been maintained as a pedigreed randombred control since 1960 with approximately 50 males and 250 females.
SOURCE: 41,

2 ATHENS-CANADIAN RANDOMBRED (AC)
CHARACT: A meat-type control population maintained with 60 individual sires each mated to seven females. The original stock used in developing this population included a White Wyandotte and three synthetic populations. The synthetic populations were of wide genetic backgrounds and included several common breeds and varieties. The AC population has single, rose, pea, and walnut combs. It is dominant white with occasional black and red showing in the white plumage. This population was obtained from the Canada Department of Agriculture in 1958.
SOURCE: 114,

3 ATHENS RANDOMBRED (ARB)
CHARACT: A meat-type control population which was developed from eight male and eight female lines. Male lines were commercial broiler stocks available in 1956 and included White Plymouth Rock, White Cornish, and New Hampshire stocks. The female lines were experimental egg production stocks from Experiment Stations in the Southern Region (Rhode Island Red, Barred Plymouth Rock, White Plymouth Rock, New Hampshire, Single Comb White Leghorn, and Cornish). This population has been maintained at the Southern Regional Poultry Genetics Laboratory with 60 individual sires each mated to eight females from 1961 to 1972. The population is currently maintained as a mass-mated population with 15 sires and 150 females. There are single and pea comb birds and plumage color ranges from white to black. The color genes *I, i^+; E, e^b; S, s^+; B* and b^+ are segregating in the population.
SOURCE: 114,

4 OTTAWA CONTROL STRAIN 5
CHARACT: This White Leghorn strain has been maintained as a pedigreed randombred control from 1950 to date. Derived from the same foundation stock as Strain 3 (item 122).
SOURCE: 12,

5 KENTVILLE CONTROL STRAIN 7
CHARACT: This White Leghorn strain has been maintained as a pedigreed randombred control since 1958 to date. It was derived from four commercial egg stocks. This strain is unrelated to Strains 1 (item 122), 2 (item 123), 3 (item 122), 4 (item 123), and 5 (item 4).
SOURCE: 12,

6 OTTAWA CONTROL STRAIN 10
CHARACT: This White Leghorn strain has been maintained as a pedigreed randombred control from 1973 to date. Derived from four North American commercial egg stocks.
SOURCE: 12,

7 SCANDINAVIAN CONTROL POPULATION (LINE C)
CHARACT: A White Leghorn randombred control line derived from a base population synthesized in 1969 by crossing seven parental strains of White Leghorns according to a polyallelic system (males from strains No. 1-6 mated to females from strains No. 1-7). Pedigreed mated with a minimum of 50 males and 250 females. Kept in four parts in each of the four Scandinavian countries. Used as control in breeding experiments as well as on test stations.
SOURCE: 22, 23, 38, 45,

8 OTTAWA MEAT CONTROL STRAIN
CHARACT: A meat-type control strain, pedigreed and randomly bred from 1958 to 1973. Non-pedigreed since 1974. Segregates for pea, rose, walnut and single comb.
SOURCE: 12,

9 OTTAWA BROILER DAM CONTROL STRAIN 30
CHARACT: Pedigreed randombred control formed in 1979 from seven commercial broiler dam stocks.
SOURCE: 12,

10 OTTAWA BROILER SIRE CONTROL STRAIN 20
CHARACT: Pedigreed randombred control formed in 1979 from nine commercial broiler stocks.
SOURCE: 12,

INBRED LINES

11 DAVIS LINE UCD-11
CHARACT: White Leghorn line. Inbreeding calculated at over 90%. Carries the *IgG-I^a* allele at the chicken *7S Ig* locus and is segregating for the *Ea-A, Ea-E, Ea-B, Ea-C, Ea-K* and *Ea-P* loci. Is homozygous for the following alleles at the other *Ea* loci: *Ea-D^1, Ea-H^1, Ea-I^2, and Ea-L^1*.
SOURCE: 91,

12 DAVIS LINE UCD-054
CHARACT: White Leghorn line from the same base population as UCD-056 and UCD-058 (items 13 and 14). Inbreeding calculated at 78%. Selected for egg numbers.
SOURCE: 91,

13 DAVIS LINE UCD-056
CHARACT: White Leghorn line from the same base population as UCD-054 and UCD-058 (items 12 and 14). Inbreeding calculated at 80%. Selected for egg numbers.
SOURCE: 91,

14 DAVIS LINE UCD-058
CHARACT: White Leghorn line from the same base population as UCD-054 and UCD-056 (items 12 and 13). Inbreeding calculated at 80%. Selected for egg numbers.
SOURCE: 91,

15 DAVIS LINE UCD-070
CHARACT: White Leghorn line from the same base population as UCD-080 and UCD-082 (items 16 and 17). Inbreeding calculated at 71%. Selected for egg numbers.
SOURCE: 91,

16 DAVIS LINE UCD-080
CHARACT: White Leghorn line from the same base population as UCD-070 and UCD-082 (items 15 and 17). Inbreeding calculated at 74%. Selected for egg numbers.
SOURCE: 91,

17 DAVIS LINE UCD-082
CHARACT: White Leghorn line from the same base population as UCD-070 and UCD-080 (items 15 and 16). Inbreeding calculated at 76%. Selected for egg numbers.
SOURCE: 91,

18 DAVIS LINE UCD-100
CHARACT: An Australorp line closed since 1935 from a commercial laying flock and inbred since 1966 as a small flock with three generations of full sib mating. Inbreeding calculated at 75%. Characterized by good hatchability and good viability.
SOURCE: 91,

19 DAVIS LINES UCD-131 and UCD-135
CHARACT: Two related lines of White Leghorn-New Hampshire background derived in 1975 from a randombred flock which was selected for short egg intervals between 1957 and 1975. Inbred by sib-mating for last seven generations with inbreeding calculated at 78%. Both lines characterized by high egg number, small egg size, low hatchability, and high early mortality.
SOURCE: 91,

20 IOWA LINE 8
CHARACT: Leghorn line inbred to about 85%. Segregating for the i^+ plumage color allele at the *I* locus. Line 8 goes back to early pedigrees of the Iowa State University 1930 Leghorn flock.
SOURCE: 123,

21 IOWA LINE 9
CHARACT: Leghorn line inbred to about 60%. Segregates for plumage color; hence, has color variations. Originally Line 9 was crossed to a Spanish breed with black plumage and then backcrossed. Not productive nor highly viable.
SOURCE: 123,

22 IOWA LINE 19
CHARACT: Leghorn line inbred to about 90%. Originates from old Iowa State University inbreds (1935).
SOURCE: 123,

23 MINNESOTA WHITE LEGHORN INBRED
CHARACT: Inbred to about 85%; closed for 35 generations. Body weight of 3.5 lbs. small eggs; cleft palate.
SOURCE: 157,

24 MINNESOTA RHODE ISLAND RED INBRED
CHARACT: Inbred to about 60%; closed for 20 generations. Body weight of 4.5 lbs.
SOURCE: 157,

25 NIBS LINE WL-15
CHARACT: White Leghorn line obtained from the National Institute of Animal Health, Tokyo, in 1967. Maintained as a randombred in closed colony. Homozygous for blood group systems of following loci by immune sera or lectins: $Ea\text{-}B^M$, hi^+/hi^+, Tg_1/Tg_1, Tg_2/Tg_2, $st_1{}^+/st_1{}^+$, $st_2{}^+/st_2{}^+$, $pw_1{}^+/pw_1{}^+$, $pw_2{}^+/pw_2{}^+$, $mp_1{}^+/mp_1{}^+$ and at^+/at^+. Seems to be fixed for other blood loci by immune sera but not identified. Homozygous for isozymes with following loci: $C\text{-}t^B$, $Es\text{-}1^S$, $Es\text{-}2^A$, Akp^F, $Akp\text{-}2^O$ and Lap^A. Segregating for gs antigen. Resistant to subgroups C and E, and susceptible to subgroups A,B and D leukosis viruses. Susceptible to Marek's disease.
SOURCE: 34,

26 NIBS LINE WL-F
CHARACT: White Leghorn line produced by pedigree breeding for 14 generations with calculated inbreeding about 50%. Seems to be fixed for most blood group loci by immune sera but not identified. Homozygous for blood group systems of following loci by lectins: hi^+/hi^+, $pn\text{-}1^+/pn\text{-}1^+$, $tg_1{}^+/tg_1{}^+$, $st_1{}^+/st_1{}^+$, St_2/St_2, $pw_1{}^+/pw_1{}^+$, $pw_2{}^+/pw_2{}^+$, $mp_1{}^+/mp_1{}^+$ and at^+/at^+. Homozygous for isozymes with following loci: $Ea\text{-}D^Q$, $C\text{-}t^B$, $Es\text{-}1^S$, $Es\text{-}2^A$, Akp^S, $Akp\text{-}2^O$ and Lap^A. Gs antigen fixed in negative. Susceptible to subgroups A, B, C, D and E leukosis viruses. Resistant to Marek's disease. High responder to injection with alloantigen.
SOURCE: 34,

27 NIBS LINE WL-GM
CHARACT: White Leghorn line produced by pedigree breeding for 10 generations with calculated inbreeding about 50%. Homozygous for blood group systems of following loci by immune sera or lectins: $Ea\text{-}B^A$, hi^+/hi^+, $Pn\text{-}1/Pn\text{-}1$, St/St, $tg_1{}^+/tg_1{}^+$, $tg_2{}^+/tg_2{}^+$, $st_1{}^+/st_1{}^+$, St_2/St_2, $pw_1{}^+/pw_1{}^+$, Pw_2/Pw_2, $mp_1{}^+/mp_1{}^+$, $mp_2{}^+/mp_2{}^+$, at^+/at^+ and Va/Va. Homozygous for isozymes with following loci: $C\text{-}t^B$, $Es\text{-}1^S$, $Es\text{-}2^A$, Akp^S, and Lap^A. Seems to be fixed for other blood group loci by immune sera but not identified. Resistant to Marek's disease.
SOURCE: 34,

28 NIBS LINE GSN/1
CHARACT: Fayoumi line obtained from Okazaki Animal Husbandry Experiment Station in 1971. Maintained by pedigree breeding for 14 generations with calculated inbreeding about 50%. Seems to be fixed for most blood group loci by immune sera but not identified. Homozygous for blood group systems of following loci by lectins: $Pn\text{-}1/Pn\text{-}1$, St_1/St_1 and at^+/at^+. GS antigen fixed in negative. Expression of ALSV subgroup glycoprotein fixed for *H-E*. Resistant to subgroup A, B and E and susceptible to subgroup C and D leukosis viruses. Resistant to Marek's disease. Homozygous for isozymes with following loci: $C\text{-}t^B$, $Es\text{-}1^S$, $Es\text{-}2^A$, Akp^S, $Akp\text{-}2^O$ and Lap^A.
SOURCE: 34,

29 NIBS LINE GSN/2
CHARACT: Fayoumi line obtained from Okazaki Animal Husbandry Experiment Station in 1971. Maintained by pedigree breeding for 14 generations with calculated inbreeding about 50%. Seems to be fixed for most blood group loci by immune sera but not identified. Different from the GSN/1 strain (item 28) in one blood group locus by immune serum. Homozygous for blood group systems of following loci by lectins: St_1 /St_1, at^+/at^+. Homozygous for isozymes with following loci: Ct^B, $Es\text{-}1^S$, $Es\text{-}2^A$, Akp^S, $Akp\text{-}2^O$ and Lap^A. GS antigen fixed in negative. Expression of ALSV subgroup glycoprotein fixed for *H-E*. Resistant to subgroup A, B and E and susceptible to subgroup C and D leukosis viruses. Resistant to Marek's disease.
SOURCE: 34,

30 NIBS LINE GSP
CHARACT: Fayoumi line obtained from Okazaki Animal Husbandry Experiment Station in 1971. Maintained by pedigree breeding for 14 generations with calculated inbreeding about 50%. Seems to be fixed for most blood group loci by immune sera but not identified. Homozygous for blood group systems of following loci by lectins: hi^+/hi^+, $pn\text{-}1^+$/$pn\text{-}1^+$, $tg_1{}^+$/$tg_1{}^+$, St_1/St_1, Pw_1/Pw_1, $mp_1{}^+$/$mp_1{}^+$ and at^+/at^+. Homozygous for isozymes with following loci: Ct^B, $Es\text{-}1^S$, $Es\text{-}2^A$, Akp^S, $Akp\text{-}2^O$ and Lap^A. GS antigen fixed in positive. Expression of ALSV subgroup glycoprotein fixed for *H-E*. Resistant to subgroup A, B and E and susceptible to subgroup C and D leukosis viruses. Resistant to Marek's disease. Low responder to injection with alloantigen.
SOURCE: 34,

31 NIBS LINE PNP
CHARACT: Fayoumi line obtained from Okazaki Animal Husbandry Experiment Station in 1971. Maintained by pedigree breeding for 14 generations with calculated inbreeding about 50%. Homozygous for blood group systems of following loci by immune sera, lectins and viralhemagglutinin: $Ea\text{-}B^G$, hi^+/hi^+, $Pn\text{-}1$/$Pn\text{-}1$, $tg_1{}^+$/$tg_1{}^+$, St_1/St_1, $st_2{}^+$/$st_2{}^+$, $pw_1{}^+$/$pw_1{}^+$, $pw_2{}^+$/$pw_2{}^+$, $mp_1{}^+$/$mp_1{}^+$, at^+/at^+ and pp^+/pp^+. Seems to be fixed for other blood group loci by immune sera but not identified. Homozygous for isozymes with following loci: Ct^B, $Es\text{-}1^S$, $Es\text{-}2^A$, Akp^S, $Akp\text{-}2^O$ and Lap^A. Segregating for gs antigen. Expression of ALSV subgroup glycoprotein fixed for *H-E*. Resistant to subgroup A, B and E and susceptible to subgroup C and D leukosis viruses. Resistant to Marek's disease. Low responder to injection with alloantigen.
SOURCE: 34,

32 OTTAWA INBRED LINE GF
CHARACT: White Leghorn strain derived from Ottawa Strain 3 (item 122) in 1969 and maintained by half-sib and full-sib matings since. Resistant to Marek's disease.
SOURCE: 12,

33 OTTAWA INBRED LINE GH
CHARACT: White Leghorn strain derived from Ottawa Strain 3 (item 122) in 1969 and maintained by half-sib and full-sib matings since. Susceptible to Marek's disease.
SOURCE: 12,

34 OTTAWA INBRD LINE XP
CHARACT: White Leghorn strain derived from Ottawa Strain 9 (item 124) in 1972 and maintained by full-sib and half-sib matings since. In 1975 divided in sublines XPO2 and XP21 that are respectively homozygous for alleles $Ea\text{-}B^2$ and $Ea\text{-}B^{21}$ of the major histocompatibility locus.
SOURCE: 12,

35 WISCONSIN INBRED LINE UW-C38m
CHARACT: An inbred White Leghorn line of UW Leghorn origin, which has been bred as a single sire line since 1948. Fertility from natural matings has fluctuated but, at present, is no problem. Initially displayed high resistance to *E. tenella* with infection being localized in the small intestine just anterior to the cecal junction. Now appears to be highly susceptible to ectoparasites.
SOURCE: 255,

36 WISCONSIN INBRED LINE UW-D168h1
CHARACT: This inbred line originated as a cross of a UW Leghorn male with Hyline incrossbreds (Leghorn-Red). Has been bred as a single sire line since 1950. Feathers are white, but the line still carries a low frequency of the gene I^+ for the feather color. Egg shell color is white. When maintained in laying cages, a high percentage of shell-less eggs are produced.
SOURCE: 255,

37 ZURICH ETH77 LINE
CHARACT: Out of a White Leghorn line which was selected for small early egg weight. Pedigree brother X sister mated, without selection. Inbreeding coefficient of 0.94. Eggs per hen house, 147; average egg weight, 42 g; mature body weight, 1.51 kg and age at first egg, 170 days. High fat content in blood serum. Blood group alleles $Ea\text{-}B^{19}$ and $Ea\text{-}B^8$ (according to Briles). Relative poor hatchability.
SOURCE: 46,

38 ZURICH ETH87 LINE
CHARACT: Out of a cross of two White Leghorn lines which were selected for large and small early egg weight. Pedigree brother X sister mated without selection. Inbreeding coefficient of 0.94. Eggs per hen housed, 176; average egg weight, 50 g; mature body weight, 1.64 kg and age at first egg, 157 days. Homozygous for the $Ea\text{-}B^{19}$ blood group allele (according to Briles). Relatively poor hatchability.
SOURCE: 46,

LIBRARY STOCK STRAINS

39 OTTAWA STRAIN 16
CHARACT: New Hampshire library stock reproduced from pedigree matings. Susceptible to Marek's disease.
SOURCE: 12,

40 POULTRY RESEARCH CENTRE J LINE
CHARACT: A closed Brown Leghorn strain which was formed in 1964 from the eight Brown Leghorn inbred lines which had been kept at the Centre up to that date.
SOURCE: 82,

41 POULTRY RESEARCH CENTRE S LINE
CHARACT: A closed flock since 1972, originating from Shaver 288 hybrid males and females. Shaver 288 was a strain cross of White Leghorns.
SOURCE: 82,

42 POULTRY RESEARCH CENTRE T LINE
CHARACT: A closed flock since 1972. Originally the Thornber 909, mainly a Rhode Island Red X Light Sussex strain.
SOURCE: 82,

43 NAGOYA BM-C STRAIN
CHARACT: Black Minorca, introduced from the University of Connecticut in 1959. Homozygous for *Ea-B*^{A} (blood group system), *Hi* (PHA agglutinogen), *Akp*^{S} (serum alkaline phosphatase) and *Es-1*^{B} (serum esterase). Maintained by intra-strain rotational crossing.
SOURCE: 33,

44 NAGOYA NG-N STRAIN
CHARACT: Japanese breed Nagoya, introduced from the Aichi-ken Agricultural Research Center (in Japan) in 1969. Homozygous for *Co*, *e*^{b}, *s*$^{+}$ (plumage); *id*$^{+}$, *W*$^{+}$ (skin color); single comb; colored egg shell; *Ea-B*^{B}, *Ea-C*^{C} (blood group system; *Hi* (PHA agglutinogen) and *Alb*^{B} (serum albumin). Maintained by intra-strain rotational crossing.
SOURCE: 33,

45 NAGOYA WL-G STRAIN
CHARACT: White Leghorn, introduced from the Nagoya Foundation for Animal Science (in Japan) in 1969. Homozygous for *hi*$^{+}$ (PHA agglutinogen), *Es-1*^{A} (serum esterase), *Alb*^{B} (serum albumin) and *Akp*^{S} (serum alkaline phosphatase). Segregates for *Ea-B*^{G} and *Ea-B*^{M} (blood group system). Maintained by intra-strain rotational crossing.
SOURCE: 33,

46 NAGOYA NH-H STRAIN
CHARACT: New Hampshire, introduced from the Hyogo Livestock Breeding Station, Ministry of Agriculture, Forestry and Fishery (in Japan) in 1969. Homozygous for *Ea-B*^{K} (blood group system), *Hi* (PHA agglutinogen), *Es-1*^{B} (serum esterase) and *Alb*^{B} (serum albumin). Maintained by intra-strain rotational crossing.
SOURCE: 33,

47 NAGOYA FA STRAIN
CHARACT: Fayoumi (Egyptian breed), introduced from the Nippon Institute for Biological Science (in Japan) in 1975. Homozygous for *e*^{b}, *S* (plumage); *id*$^{+}$, *w* (skin color); single comb; colored egg shell; *Ea-C*^{C} (blood group system); *Es-1*^{B} (serum esterase) and *Alb*^{B} (serum albumin). Maintained by intra-strain rotational crossing.
SOURCE: 33,

48 NIBS LINE BM-C
CHARACT: This Black Minorca strain was received from Nagoya University in 1970 (item 43), since then has been maintained to date as a randombred in closed colony. Homozygous for blood group systems of following loci by immune sera or lectins: *Ea-B*^{A}, *Ea-D*^{Q}, *Hi*/*Hi*, *si*$^{+}$/*si*$^{+}$, *tg*$_{1}$/*tg*$_{1}$, *St*$_{1}$/*St*$_{1}$, *st*$_{2}$$^{+}$/*st*$_{2}$$^{+}$, *pw*$_{1}$$^{+}$/*pw*$_{1}$$^{+}$, *pw*$_{2}$$^{+}$/*pw*$_{2}$$^{+}$, *mp*$_{1}$$^{+}$/*mp*$_{1}$$^{+}$, *at*$^{+}$/*at*$^{+}$ and *va*$^{+}$/*va*$^{+}$. Homozygous for isozymes with following loci: *Cr*^{B}, *Es-1*^{S}, *Es-2*^{A}, *Akp*^{S}, and *Lap*^{A}. Segregating for gs antigen. Expression of ALSV subgroup glycoprotein fixed for *H-E*. Resistant to subgroups A and E, and susceptible to B, C and D leukosis viruses. Resistant to Marek's disease. Low responder to injection with alloantigen.
SOURCE: 34,

CHROMOSOME REARRANGEMENT STRAINS

49 MINNESOTA REARRANGEMENT STRAINS
CHARACT: The following are available as well as possibly others. Translocations between chromosomes 1 and a microchromosome, 2 and a microchromosome, 1 and 4, 1 and the Z sex chromosome, and 3 and the Z chromosome. All are excellent marker chromosomes, easily recognized in mitotic metaphase configuration. Most are established as homozygous strains.
SOURCE: 157,

50 OHIO TRANSLOCATION STRAINS
CHARACT: Twenty x-ray induced translocations involving major autosomes, Z sex chromosome and microchromosomes.
SOURCE: 207,

51 OHIO INVERSION STRAINS
CHARACT: Stock heterozygous for percentric inversion of chromosome 2.
SOURCE: 207,

MUTANT GENE STRAINS

52 LIGHT BROWN LEGHORN, e^{+}/e^{+}
CHARACT: A tester strain, particularly valuable for testing recessive whites for *E* or *e*^{Wh} at the *E* locus of the columbian *Co* gene.
SOURCE: 144,

53 BROWN STRAIN, e^{b}/e^{b}
CHARACT: A synthetic strain useful as a tester for *E*, *e*^{Wh} or *e*$^{+}$ at the *E* locus.
SOURCE: 144,

54 DOMINANT WHEATEN STRAIN, e^{Wh}/e^{Wh}
CHARACT: A synthetic line originally derived from White Plymouth Rock X Light Brown Leghorn cross.
SOURCE: 144,

55 COLOR AND WHITE STRAIN
CHARACT: A synthetic strain carried over ten generations as a random breeding strain segregating for the *C*$^{+}$, *c* (no dominant white), *E*, *e*$^{+}$, *e*^{b}, *Co* and *co*$^{+}$ genes.
SOURCE: 144,

56 BUTTERCUP ALLELE TESTER, e^{bc}/e^{bc}
CHARACT: A synthetic tester strain homozygous for the *e*^{bc} and *db*$^{+}$ (*e*^{bc}/*e*^{bc},*db*$^{+}$/*db*$^{+}$) genes.
SOURCE: 144,

57 *Db* TESTER STRAIN
CHARACT: A syntheic tester strain homozygous for the *e*^{b} and *Db* (*e*^{b}/*e*^{b}, *Db*/*Db*) genes.
SOURCE: 144,

58 SILKIE GENE POOL
CHARACT: Segregating stock originating from cross between White Silkie and Brown Tester Strain (item 53). Segregating mutations include fibromelanosis *(Fm)*, dermal melanin inhibitor *(Id)*, polydactyly *(Po)*, crest *(Cr)*, muffs and beard *(Mb)*, silkie plumage *(h)* , recessive white *(c)*, brown *(e*^{b}*)*, silver *(S)* and columbian *(Co)* genes.
SOURCE: 144,

59 DWARF LEGHORN STRAIN
CHARACT: A dwarf *(dw)* Leghorn strain which originated from a sample sent from Institut fur Kleintierzucht, Celle, Germany. This strain is kept segregating for *Hi* genes and the egg albumen protein genes.
SOURCE: 24,

60 CREAM PLUMAGE COLOR GENE STOCK
CHARACT: This stock is segregating for the cream *(ig)* plumage color gene.
SOURCE: 24,

61 RHODE ISLAND RED BLOOD-TYPE STRAIN
CHARACT: This Rhode Island Red strain is maintained such that it segregates for blood type genes at three loci.
SOURCE: 24,

62 IOWA LINE S1
CHARACT: Outbred population of White Leghorns originated in 1965 from two Hyline inbred lines. Segregating at the *Ea-B* blood group locus. Bidirectional selection for humoral immune response to amino acid polymer, GAT; and progression/regression of Rous sarcoma virus-induced tumors.
SOURCE: 123,

63 WISCONSIN LINE UW-H299
CHARACT: A White Leghorn inbred line of UW Leghorn origin. Has been bred as a single sire line since 1948. This line carries the gene *t* (item 424) for tardy feathering at a low frequency and a high proportion of the birds exhibit congenital baldness (item 416). Many of these females have salmon breast plumage color.
SOURCE: 255,

64 SEGREGATING GENE POOL 1 - FRANCE
CHARACT: A synthetic strain developed from initial crosses in 1954-55 which included Rhode Island Reds, White Wyandottes and two local French breeds, Gatinais and Marans. Further limited introductions of naked neck *(Na)* from a local population and blue egg-shell color *(O)* from Araucanas have been made. Segregation is maintained from plumage color genes *c*, *E* , e^b, e^y, *B* and *Bl*; skin color genes *w* and W^+; comb-type genes *R*, *P*, He^+ and he^l; the blue egg gene *O*; the antigenic factor *Hi* and the egg albumen protein genes G_2^A, G_2^B, G_3^A, G_3^B, Ty^A and Ty^B. Body weight of this strain averages about 2.3 kg at 10 months of age.
SOURCE: 24,

65 SEGREGATING GENE POOL 2 - FRANCE
CHARACT: Same as for item 64 but segregating only for dominant white *(I)*, rose comb *(R)*, pea comb *(P)*, white skin (W^+) and blue egg shell color *(O)* genes.
SOURCE: 24,

66 SEGREGATING GENE POOL 3 - FRANCE
CHARACT: A dwarf *(dw)* stock with the same genes segregating as in item 64 plus the addition of egg albumen protein genes Ov^A and Ov^B. This stock is subdivided into two strains.
a) "Light" dwarfs with an average body weight at 10 months of age of about 1.5 kg. Same origin as item 64 plus the *dw* gene.
b) "Heavy" dwarfs with an average body weight at 10 months of age of about 2.2 kg. Obtained from crossing with a heavy strain from Le Magneraud Station.
SOURCE: 24,

67 NIBS LINE AN
CHARACT: Fayoumi line obtained from Okazaki Animal Husbandry Experiment Station. Maintained by pedigree breeding for 15 generations with calculated inbreeding about 40%. Homozygous for the character of hereditary nervous disorder.
SOURCE: 34,

68 NIBS LINE YL
CHARACT: Fayoumi line obtained from Okazaki Animal Husbandry Experiment Station in 1971. Maintained by pedigree breeding for 3 generations. All chickens of this strain reveal corneal degeneration. A few chickens with delayed amelanosis appear in this strain.
SOURCE: 34,

69 *Cp* STRAIN
CHARACT: Cross bred made in 1976 among Sebright Bantam, White Leghorn and three Japanese breeds (Nagoya, Jitokko and Goshiki-Shokoku). *Cp* carrier, derived from Jitokko. Homozygous for *Co* , e^b, s^+ (plumage), id^+ W^+ (skin color), *R* (rose comb), colored egg shell and Alb^B (serum albumin). Maintained by intra-strain rotational crossing.
SOURCE: 33,

70 BLUE-EGG PEA-COMB STRAIN (P-OO)
CHARACT: Strain produced from an egg production population of Leghorn. Homozygous for the dominant white plumage *(I/I)*, blue egg *(O/O)* , pea comb *(P/P, r/r)* , and yellow skin *(w/w)* genes.
SOURCE: 26, 27,

71 MACDONALD DWARF LINE
CHARACT: For identification of a possible new type of genetic dwarfism.
SOURCE: 18,

72 SASKATOON FAYOUMI LINE
CHARACT: Segregating for columbian and autosomal barred plumage, white and yellow skin, single and duplex comb. Maintained unselected since 1965.
SOURCE: 20,

73 SPELDERHOLT WHITE LEGHORN, *adw/adw*
CHARACT: An *adw* White Leghorn strain in which the *adw* gene (item 387) originated from the Cornell *adw* line in 1981. Hatchability and viability are good.
SOURCE: 37,

DISEASE CONTROL LINES AND STRAINS

74 RPRL LINE 6_1 (SPF)
CHARACT: Inbreeding coefficient of about .99. Histocompatible - wattle skin grafts. Cellular susceptibility to subgroup A, B and C leukosis viruses. Resistant to Marek's disease. Free of LL, MD, IBV, RE, NDV, AE, MG and SP. Blood typed at the *Ea-A* , *Ea-B* , *Ea-C* , *Ea-D*, *Ea-H* , *Ea-I* , *Ea-K* , *Ea-L* and *Ea-P* loci.
SOURCE: 152,

75 RPRL LINE 6_3 (SPF)
CHARACT: Inbreeding coefficient of about .99. Cellular susceptibility to subgroup A, B and C leukosis viruses. Resistant to Marek's disease. Free of LL, MD, IBV, RE, NDV, AE, MG and SP. Blood typed at the *Ea-A* , *Ea-B* , *Ea-C* , *Ea-D* , *Ea-H* , *Ea-I* , *Ea-K* , *Ea-L* and *Ea-P* loci.
SOURCE: 152,

76 RPRL LINE 7_1 (SPF)
CHARACT: Inbreeding coefficient of about .99. Resistant to infection by subgroup A leukosis viruses. Susceptible to Marek's disease. Free of LL, MD, IBV, RE, NDV, AE, MG and SP. Blood typed at the *Ea-A*, *Ea-B*, *Ea-C*, *Ea-D* , *Ea-H* , *Ea-I*, *Ea-K*, *Ea-L* and *Ea-P* loci.
SOURCE: 152,

77 RPRL LINE 7_2 (SPF)
CHARACT: Inbreeding coefficient of about .99. Resistant to infection by subgroup A and B leukosis viruses. Susceptible to Marek's disease. Free of LL, MD, IBV, RE, NDV, AE, MG and SP. Blood typed at the *Ea-A* , *Ea-B* , *Ea-C*, *Ea-D* , *Ea-H* , *Ea-I*, *Ea-K*, *Ea-L* and *Ea-P* loci.
SOURCE: 152,

78 RPRL LINE 15_1 (SPF)
CHARACT: Inbreeding coefficient of about .99. Segregating susceptibility to subgroup A, B and C leukosis viruses. Susceptible to lymphoid leukosis tumor formation. Susceptible to Marek's disease. Free of LL, MD, IBV, RE, NDV, AE, MG and SP. Blood typed at the *Ea-A* , *Ea-B* , *Ea-C* , *Ea-D* , *Ea-H* , *Ea-I* , *Ea-K* , *Ea-L* and *Ea-P* loci.
SOURCE: 152,

79 RPRL LINE $15I_4$ (SPF)
CHARACT: Inbreeding coefficient of about .99. Segregating susceptibility to subgroup A, B and C leukosis viruses. Susceptible to lymphoid leukosis tumor formation. Susceptible to Marek's disease. Free of LL, MD, IBV, RE, NDV, AE, MG and SP. Blood typed for the *Ea-A* , *Ea-B* , *Ea-C*, *Ea-D* , *Ea-H*, *Ea-I*, *Ea-K* , *Ea-L* and *Ea-P* loci.
SOURCE: 152,

80 RPRL LINE 15_B (SPF)
CHARACT: Inbreeding coefficient of about .95. Segregating susceptibility to subgroup A, B, D and E and resistance to subgroup G leukosis viruses. Free of LL, MD, IBV, RE, NDV, AE, MG and SP. Blood typed for the *Ea-A* , *Ea-B* , *Ea-C* , *Ea-D* , *Ea-H* , *Ea-I* , *Ea-K*, *Ea-L* and *Ea-P* loci.
SOURCE: 152,

81 RPRL LINE $15I_5$ (SPF)
CHARACT: Inbreeding coefficient of about .99. Segregating susceptibility to subgroup A, B and C leukosis viruses. Susceptible to lymphoid leukosis tumor formation. Susceptible to Marek's disease. Free of LL, MD, IBV, RE, NDV, AE, MG and SP. Blood typed at the *Ea-A* , *Ea-B* , *Ea-C* , *Ea-D*, *Ea-H* , *Ea-I*, *Ea-K* , *Ea-L*, *Ea-P* and *Ea-R* loci.
SOURCE: 152,

82 RPRL LINE 100 (SPF)
CHARACT: Susceptible to Marek's disease. Susceptible to lymphoid leukosis tumor formation. Free of LL, MD, IBV, RE, NDV, AE, MG and SP. Blood typed at the *Ea-A* , *Ea-B* , *Ea-C* , *Ea-D*, *Ea-H* , *Ea-I*, *Ea-K* , *Ea-L* , *Ea-P* and *Ea-R* loci.
SOURCE: 152,

83 RPRL LINE 100_B (SPF)
CHARACT: Identical to RPRL Line 100 in origin (item 82). Maintained by repeated backcrossing to RPRL Line 7_2 (item 77). The dominant gene "tumor virus b^{5a} *(Tv-B^5)* is maintained in the line and mating to homozygous recessive females of RPRL Line 7_2 . Free of LL, MD, IBV, IBV, RE, NDV, AE, MG and SP.
SOURCE: 152,

84 RPRL LINE 0 (SPF)
CHARACT: Free of endogenous avian leukosis viral genes by DNA hybridization. Susceptible to infection by subgroup A, B, C and D avian leukosis viruses. Free of LL, MD, RE, NDV, MG and SP.
SOURCE: 152,

85 RPRL REASEHEATH LINE C (SPF)
CHARACT: Highly inbred White Leghorn line which has been closed mated since the 1930's (mostly full-sib). Nearly isohistogenic, but males tend to reject female skin grafts, i.e., responsive to female histoantigens. Resistant to subgroup A and E.avian leukosis viruses and lacks natural group specific antigen of the avian leukosis viruses. Free of LL, MD, RE, NDV, MG and SP.
SOURCE: 152,

86 LETHBRIDGE RPRL LINE 15
CHARACT: Susceptible to lymphoid leukosis tumor formation and to Marek's disease. From USDA Regional Poultry Research Laboratory, East Lansing, Michigan.
SOURCE: 5,

87 HOUGHTON LINE 6
CHARACT: White Leghorn line closed since 1972, 5th generation since importation of hatching eggs from USDA Poultry Regional Research Laboratory, East Lansing, Michigan, USA. Coefficient of inbreeding 0.99. Susceptible to infection with lymphoid leukosis virus of A, B, C and D subgroups. Resistant to lymphoid leukosis tumor development and to Marek's disease. Histocompatible for skin grafting within and between famililes.
SOURCE: 48, 82,

88 HOUGHTON LINE 7
CHARACT: White Leghorn line closed since 1972, 5th generation since importation of hatching eggs from USDA Regional Poultry Research Laboratory, East Lansing, Michigan, USA. Coefficient of inbreeding 0.99. Susceptible to Marek's disease and to infection with lymphoid leukosis virus of subgroup C. Resistant to infection with lymphoid leukosis virus of A, B, D and E subgroups. Histocompatible by skin grafting within family.
SOURCE: 48,

89 HOUGHTON LINE 15
CHARACT: White Leghorn line closed since 1962, 15th generation since importation of hatching eggs from USDA Regional Poultry Research Laboratory, East Lansing, Michigan, USA. Coefficient of inbreeding 0.95. Susceptible to infection with lymphoid leukosis virus of A and C subgroups and segregating for B, D and E subgroups, and moderately susceptible to Marek's disease.
SOURCE: 48,

90 HOUGHTON LINE 5
CHARACT: White Leghorn line derived from Houghton Line 15 (item 89). Has the same general characteristics as Line 15 except that its MCH type is B^5.
SOURCE: 48,

91 HOUGHTON LINE 0
CHARACT: A White Leghorn line received from USDA Regional Labortory, East Lansing, Michigan USA. It is susceptible to the A, B and C subgroups of avian leukosis viruses, and has no endogenous avian leukosis virus proviruses. This line is homozygous for *Ea-B*^{21}.
SOURCE: 48,

92 HOUGHTON BROWN LEGHORN
CHARACT: Closed since 1962, 15th generation since import of hatching eggs from Poultry Research Centre, Edinburgh. Coefficient of inbreeding 0.50. Susceptible to infection with lymphoid leukosis virus of A, B, C and D subgroups, moderately susceptible to Marek's disease.
SOURCE: 48,

93 HOUGHTON REASEHEATH LINE C
CHARACT: Closed since 1961, after acquisition from Reaseheath. Coefficient of inbreeding 0.99. Susceptible to infection with lymphoid virus of B, C and D subgroups and resistant to A and E subgroups. Resistant to Marek's disease.
SOURCE: 48, 82,

94 CORNELL K-RESISTANT STRAIN
CHARACT: White Leghorn, closed flock, pedigree-bred for 34 years but randombred since 1971. Quite resistant to the avian leukosis complex following long-term selection to naturally occurring leukosis. Selected for egg production, egg size, medium body weight, and other economic traits. Henhoused production to 500 days of age -- 225-230 eggs, egg weight - 60 gm, mature body weight - 1.8 kg.
SOURCE: 190,

95 CORNELL K-RESISTANT STRAIN (OTTAWA)
CHARACT: White Leghorn strain imported from Cornell in 1971. Presently maintained without selection. Quite resistant to the avian leukosis complex (Marek's disease) following long-term selection to naturally occurring leukosis.
SOURCE: 12,

96 CORNELL S-SUSCEPTIBLE STRAIN (OTTAWA)
CHARACT: White Leghorn strain imported from Cornell in 1971. Presently maintained without selection. High susceptibility to the leukosis complex (Marek's disease) following long-term selection to naturally occurring leukosis.
SOURCE: 12,

97 CORNELL JM-N STRAIN
CHARACT: A White Leghorn strain resistant to the JM isolate of Marek's disease virus. Derived from the Cornell Regional Randombred stock. Selected only for resistanc to JM virus. Susceptibility of 4th generation chicks, based on mortality and/or lesions at eight weeks following intra-abdominal inoculation, was 4.0%. Maintained in specific pathogen-free environment and are therefore free of LL, MD, IBV, RE, NDV, AE, MG, MS, SP, and ILT. Also blood typed at the *Ea-A*, *Ea-B* , *Ea-C*, *Ea-D* , *Ea-H* , *Ea-I*, *Ea-K*, *Ea-L* and *Ea-P* loci.
SOURCE: 152,

98 CORNELL JM-P STRAIN
CHARACT: Susceptible to the JM isolate of Marek's disease virus. Derived from the Cornell Regional Randombred stock. Selected only for susceptibility to JM virus. Susceptibility of 4th generation chicks, based on mortality and/or lesions at eight weeks following intra-abdominal inoculation, was 96.0%. Maintained in specific pathogen-free environment and are therefore free of LL, MD, IBV, RE, NDV, AE, MG, SP and ILT. Also blood typed at the *Ea-A*, *Ea-B* , *Ea-C* , *Ea-D* , *Ea-H* , *Ea-I* , *Ea-K*, *Ea-L* and *Ea-P* loci.
SOURCE: 152,

99 CORNELL N-2a STRAIN
CHARACT: Homozygous for B and C blood groups ($Ea\text{-}B^{21}/Ea\text{-}B^{21}$, $Ea\text{-}C^{2}/Ea\text{-}C^{2}$), highly resistant to Marek's disease virus. Maintained in strict isolation and free of all viral agents tested for. Have not been tested for pararotavirus and astrovirus.
SOURCE: 192,

100 CORNELL P-2a STRAIN
CHARACT: Homozygous for B and C blood groups ($Ea\text{-}B^{19}/Ea\text{-}B^{19}$, $Ea\text{-}C^{2}/Ea\text{-}C^{2}$), highly susceptible to Marek's disease virus. Maintained in strict isolation and free of all viral agents tested for. Have not been tested for pararotavirus and astrovirus.
SOURCE: 192,

101 CORNELL S-13 STRAIN
CHARACT: Homozygous for B blood group ($Ea\text{-}B^{13}/Ea\text{-}B^{13}$), highly susceptible to Marek's disease virus. This line was derived from the S-strain and has recently been characterized for the MHC locus. Maintained in lower security facility and known to be free of most avian viruses.
SOURCE: 192,

102 ARKANSAS ROUS SARCOMA REGRESSION STRAIN
CHARACT: Selected for five generations for tumor regression following formation after exposure to the Rous sarcoma virus. This strain was selected from the F_1 and F_2 crosses of White Leghorn and Giant Jungle Fowl.
SOURCE: 89,

103 ARKANSAS ROUS SARCOMA PROGRESSION STRAIN
CHARACT: Selected for five generations for tumor progression following formation after exposure to the Rous sarcoma virus. This strain was selected from the F_1 and F_2 crosses of White Leghorn and Giant Jungle Fowl.
SOURCE: 89,

104 SPAFAS RANDOMBRED COFAL NEGATIVE SPECIFIC PATHOGEN FREE STRAIN
CHARACT: Closed flock for 13 years. Originated from the Mount Hope Leghorn Strain.
SOURCE: 110,

105 LIVERPOOL SPF STRAIN
CHARACT: A closed chicken laying strain, originally formed from White Leghorn commercial hybrids, which is specific pathogen free for the following diseases; Newcastle disease, infectious bronchitis, infectious laryngotracheitis, epidemic tremor, Marek's disease, leukosis, all mycoplasmas, reoviruses and adenoviruses.
SOURCE: 47,

106 HOUGHTON RHODE ISLAND RED
CHARACT: Closed since 1961, 16th generation since import of hatching eggs from a single source, a commercial pedigree breeder. Selected for susceptibility to Marek's disease. Resistant to lymphoid leukosis virus of B and D subgroups and segregating for A and C subgroups.
SOURCE: 48,

107 HOUGHTON LIGHT SUSSEX
CHARACT: Closed since 1951, 17th generation since import of hatching eggs from a single source, a commercial pedigree breeder. Susceptible to Eimeria species, segregating for lymphoid leukosis virus A, B, C, D and E subgroups.
SOURCE: 48,

108 OTTAWA RESISTANT STRAIN 2R
CHARACT: White Leghorn strain formed from inbred lines that were derived from Ottawa Strains 2 and 4 (item 123) and were selected for resistance to Marek's disease and for high egg production.
SOURCE: 12,

109 OTTAWA RESISTANT STRAIN 3R
CHARACT: White Leghorn strain formed from inbred lines that were derived from Ottawa Strains 1 and 3 (item 122) and were selected for resistance to Marek's disease and high egg production.
SOURCE: 12,

110 OTTAWA RESISTANT STRAIN 8R
CHARACT: White Leghorn strain formed from inbred lines that were derived from Ottawa Strains 8 and 9 (item 124) and were selected for resistance to Marek's disease and for high egg production.
SOURCE: 12,

111 ONTARIO LINE 2 – SPF
CHARACT: A specific pathogen free White Leghorn line.
SOURCE: 13,

112 NIBS LINE M – SPF POPULATION
CHARACT: White Leghorn line maintained for 16 years by rotation system using 8 flocks. Segregating for gs antigen. Two sublines have been maintained, one line, WL-M/O, with cellular susceptibility to subgroups A, B, C, D and E, and the other line, WL-M/bc, resistant to subgroups B and E leukosis viruses. Free of LL, ND, AE, ILT, RE, Reo, Adeno, Avian parainfluenza, FP, IB, and IBD viruses, Hp, Sp, Mg, Ms, Pullorum disease and Coccidiosis.
SOURCE: 34,

113 NIBS LINE S – SPF POPULATION
CHARACT: White Leghorn line originated from Line M (item 112). Maintained as randombred in closed colony. Free of LL, ND, AE, ILT, RE, Reo, Adeno, Avian influenza, Avian parainfluenza, FP, IB and IBD viruses, Hp, Sp, Mg, Ms, Pullorum disease and Coccidiosis.
SOURCE: 34,

114 IOWA LINE W
CHARACT: Partially inbred, heavy-breed line. Originated from a Rhode Island Red X Barred Plymouth Rock cross at the Welp breeding farm. Cellular susceptibility to subgroups A, B and C Rous sarcoma viruses.
SOURCE: 123,

115 EXPERIMENTAL LINE G
CHARACT: A White Leghorn line which originated from *inter se* matings of a commercial hybrid strain. Has been a closed line since 1965 with pedigree selection for resistance or susceptibility to leukosis virus infection (subgroups A and B). Susceptible subline nearly homozygous susceptible to leukosis infection and resistant subline homozygous resistant against leukosis infection. Average hen housed egg production, 190 eggs; average egg weight, 53 gm and mature body weight, 1.8 kg.
SOURCE: 29,

116 EXPERIMENTAL LINE M
CHARACT: A White Leghorn line which originated from an import of Cashman Leghorn. Has been a closed line since 1968 with pedigree selection for resistance or susceptibility to leukosis virus infection (subgroups A and B). Susceptible subline nearly homozygous susceptible to leukosis infection and and resistant subline homozygous resistant against leukosis infection. Average hen housed egg production, 200 eggs; average egg weight, 58 gm and mature body weight, 2.1 kg.
SOURCE: 29,

117 EXPERIMENTAL LINE R
CHARACT: A White Leghorn line which originated from a hatching egg importation of Cornell K line. Has been a closed line since 1966 with pedigree selection for resistance or susceptibility to leukosis virus infection (subgroups A and B). Susceptible sub-line nearly homozygous susceptible to leukosis infection and resistant sub-line homozygous resistant against leukosis infection. Average hen housed egg production, 190 eggs; average egg weight, 57 g and mature body weight, 1.9 kg.
SOURCE: 29,

EGG PRODUCTIVITY STRAINS

118 WHITE LEGHORN EGG STRAINS
CHARACT: Three White Leghorn strains being used in a practical egg production breeding program to produce a three-way cross. They are being selected by reciprocal recurrent selection for cross-performance.
SOURCE: 43,

119 EXPERIMENTAL LINE LZ
CHARACT: A White Leghorn line originating from the Kathmann Breeding Farm, Calvesloge, F.R. Germany. Has been a closed line since 1965. These birds carry the sex-linked dwarfism gene (item 388) which spontaneously mutated in the commercial breeding population. Average hen housed egg production 200 eggs; average egg weight, 56 g and mature body weight, 1.3 kg.
SOURCE: 29,

120 DAHLEM NAKED DWARF BROWN EGG LINE
CHARACT: The naked neck *(Na)* (item 417) and dwarf *(dw)* (item 388) genes were transferred into a high yielding commercial medium sized brown egg laying stock (RIR) by upgrading. The line is index selected for egg numbers and egg weight. The 40 weeks performance data is 70 eggs per hen housed, 55 g average egg weight and 1.6 kg body weight.
SOURCE: 30,

121 DAHLEM NAKED DWARF WHITE EGG LINE
CHARACT: The naked neck *(Na)* (item 417) and dwarf *(dw)* (item 388) genes were transferred into a high yielding commercial small sized white egg laying stock (WL) by upgrading. The line is index selected for egg numbers and egg weight. The 40 weeks performance data is 90 eggs per hen housed, 54 g average egg weight and 1.15 kg body weight.
SOURCE: 30,

122 OTTAWA SELECTED STRAINS 1 AND 3
CHARACT: White Leghorn strain 3 has been selected for high egg production from 1950 to date (except two generations, 1969 and 1970 when it was randombred). In 1971 it was divided into 2 strains (Strains 1 and 3), and both were put under selection for high production.
SOURCE: 12,

123 OTTAWA SELECTED STRAINS 2 AND 4
CHARACT: White Leghorn strain 4 was formed in 1951 from 7 Canadian Leghorn strains, and was selected for high egg production since. In 1969, Strain 4 was divided into two strains (Strains 2 and 4), and both were continued under selection for high egg production.
SOURCE: 12,

124 OTTAWA SELECTED STRAINS 8 AND 9
CHARACT: White Leghorn strains 8 and 9 were derived from Strain 7 (item 5) in 1969. They have been selected for high egg production since.
SOURCE: 12,

125 DAVIS LINE UCD-40
CHARACT: A White Leghorn strain selected for egg production from 1932 to date. Inbreeding calculated to average about 30%.
SOURCE: 91,

126 DAVIS DOUBLE YOLK LINE UCD-48
CHARACT: A White Leghorn strain selected for high incidence of double-yolked eggs. Lays 30 double-yolked eggs by 40 weeks of age. Derived from UC-Line 40 (item 125).
SOURCE: 91,

127 WISCONSIN NEW HAMPSHIRE LINE
CHARACT: A closed flock, pedigree bred strain of New Hampshires which has been selected for egg numbers and viability since 1943 using 2-6 sires per generations.
SOURCE: 255,

128 WISCONSIN INBRED ANCONA LINE
CHARACT: This line is selected for egg numbers and viability. It was formed from strains which were bred as separate lines from 1948-1963. In 1963 these lines were combined and bred as a single line, usually one sire per generation. It exhibits a high incidence of fraying on the chick primary and secondary flight feathers, presumably due to a higher zinc requirement. For each generation (annual) it has been typed since 1971.
SOURCE: 255,

129 WISCONSIN RESEARCH LEGHORNS
CHARACT: A pedigree bred strain of Single Comb White Leghorns, which has been selected for egg numbers and viability. This strain has been a closed flock since 1948, using 10-14 sires per generation.
SOURCE: 255,

130 WISCONSIN LINE UW-HN
CHARACT: This White Leghorn line is of H & N origin and was bred as a single sire flock from 1949 until 1972. It has been carried as two sub-lines since that time. This line has been blood typed since 1971 and it carries the *t* gene for tardy feathering (item 424) at low frequency.
SOURCE: 255,

131 WISCONSIN LINES UW-6X and UW-Sp2
CHARACT: Two White Leghorn sublines developed from eggs obtained from Spruceleight Farm, Brantford, Ontario, Canada in 1950. Each subline bred as a single sire flock since 1950. This strain bred at Spruceleigh Farm as a closed flock and originated from 2000 hatching eggs (Wyckoff strain) imported in 1919. Has been blood typed since 1971.
SOURCE: 255,

132 UPPSALA LINE N
CHARACT: Derived from Line C (item 7) in 1974 (F_4 generation). Selected for number of eggs in the period 20-42 weeks of age.
SOURCE: 45,

133 UPPSALA LINE E
CHARACT: Derived from Line C (item 7) in 1974 (F_4 generation). Selected for egg weight in the period 20-42 weeks of age.
SOURCE: 45,

134 UPPSALA LINE I_1
CHARACT: Derived from Line C (item 7) in 1974 (F_4 generation). Selected for an index of number of eggs and egg weight.
SOURCE: 45,

135 UPPSALA LINE I_2
CHARACT: Derived from Line C (item 7) in 1974 (F_4 generation. Selected for an index number of eggs and egg weight. Replicate of Line I_2 (item 134).
SOURCE: 45,

136 UPPSALA LINE Ec_1
CHARACT: Derived from a base population formed by crossing 10 parental strains of White Leghorn type according to a polyallelic system (males from strains No. 1-9 mated to females from strains No. 1-10). Mass selection for number of eggs and shell strength in 1972 (F_2) followed by random mating until 1978. From that year selected for an economic index based on egg mass, food conversion and shell strength.
SOURCE: 45,

137 UPPSALA LINE Ec_2
CHARACT: Derived from a Danish White Leghorn line imported to Sweden in 1974. Random mating until 1978. From that year selected for an economic index based on egg mass, food conversion and shell strength.
SOURCE: 45,

138 FAVRHOLM: HOME GROWN DIET STRAIN
CHARACT: A White Leghorn stock derived from two commercial lines in 1972; after which it was selected for improved egg laying traits under a feeding regimes in which diets were composed from barley, alfalfa, vitamins, and minerals.
SOURCE: 22,

139 DESCHAMBAULT LEGHORN LINE 3
CHARACT: Derived from Macdonald White Leghorn. Closed flock since 1956. Under pure line selection for egg numbers.
SOURCE: 19,

140 DESCHAMBAULT LEGHORN LINE 5
CHARACT: Commercial origin. Closed flock since 1958. Under pure line selection for egg numbers.
SOURCE: 19,

141 DESCHAMBAULT LEGHORN LINE 8
CHARACT: Derived from Saskatchewan White Leghorn. Closed flock since 1955. Under pure line selection for egg numbers.
SOURCE: 19,

142 DESCHAMBAULT LEGHORN LINE 9
CHARACT: Commercial origin. Not related to Line 5 (item 140). Closed flock since 1956. Under pure line selection for egg size.
SOURCE: 19,

143 SINGLE COMB WHITE WYANDOTTE STRAIN (M-22)
CHARACT: Reserve genetic pool of a former egg production strain. Selected for brown colored egg. Homozygous for recessive white plumage *(c/c, i^+/i^+, S/S)*, single comb and yellow skin *(w/w)*.
SOURCE: 26, 27,

144 SYNTHETIC BROWN EGG STRAIN (M-33)
CHARACT: Reserve genetic pool of a former egg population obtained from crosses with the French Marans breed and selected for dark brown egg. Homozygous for a single comb and yellow skin *(w/w)*.
SOURCE: 26, 27,

BODY WEIGHT STRAINS

145 OTTAWA SELECTED MEAT STRAIN
CHARACT: Derived from three lines which had been selected from the Ottawa meat control (item 8) base for high 56-day body weight over the period of 1958 to 1973. These three lines were pooled in 1974 by diallele crossing and have been randombred since then.
SOURCE: 12,

146 OTTAWA BROILER DAM STRAINS 31 & 32
CHARACT: Derived from Broiler Dam Control strain 30 (item 9). Both are being selected for high body weight, feed efficiency and egg production.
SOURCE: 12,

147 OTTAWA BROILER SIRE STRAINS 21 & 22
CHARACT: Derived from Broiler Sire Control strain 20 (item 10). Both are being selected for high body weight and low fat.
SOURCE: 12,

148 OTTAWA BROILER SIRE STRAINS 23 & 24
CHARACT: Derived from Broiler Sire Control strain 20 (item 10). Both are being selected for high body weight and feed efficiency.
SOURCE: 12,

149 OTTAWA BROILER SIRE STRAINS 25 & 26
CHARACT: Derived from Broiler Sire Control strain 20 (item 10). Both are being selected for high body weight, low fat and feed efficiency.
SOURCE: 12,

150 TRURO MEAT STRAIN
CHARACT: Broiler breeder female line, sex-linked recessive dwarf *(dw)* (item 388), derived from Peel's. Selected for egg size and egg numbers.
SOURCE: 10,

151 BRESSE-PILE HIGH BODY WEIGHT STRAIN
CHARACT: Selected from the former Bresse-Pile control strain for high body weight (about 1250 g at 9 weeks of age). Homozygous for the *I* and s^+ genes, single comb and white skin.
SOURCE: 27,

152 BRESSE-PILE LOW BODY WEIGHT STRAIN
CHARACT: Selected from the former Bresse-Pile control strain for low body weight (about 550 g at 9 weeks of age).
SOURCE: 27,

153 VIRGINIA BODY WEIGHT STRAINS
CHARACT: Two strains, one selected for high and the other for low eight week juvenile body weight. These strains originated in 1957 from crosses of inbred White Rocks, and now differ by seven standard deviations.
SOURCE: 247,

154 SPELDERHOLT BODY WEIGHT REFERENCE STRAIN
CHARACT: Derived in 1976 from three commercial broiler sire strains; thereafter selected for six week body weight.
SOURCE: 37,

155 SPELDERHOLT FEED CONVERSION STRAIN
CHARACT: Derived from the Reference strain (item 154) and selected for individual feed conversion from three to six weeks of age.
SOURCE: 37,

156 NOUZILLY FAT LINE
CHARACT: A synthetic experimental strain, mostly of White Plymouth Rock origin, selected for high abdominal fat/body weight ratio.
SOURCE: 28,

157 NOUZILLY LEAN LINE
CHARACT: A synthetic experimental strain, same origin as the Nouzilly Fat Line (item 156), selected for low abdominal fat/body weight ratio. This line now has 2 to 3 times less fat than the companion fat line (item 156) at nine weeks of age.
SOURCE: 28,

158 STRYNO FCR-LOW PROTEIN LINE
CHARACT: A White Cornish line selected since 1979 for low food conversion ratio while being fed a low-protein diet. Same origin as item 159.
SOURCE: 22,

159 STRYNO FCR-NORMAL PROTEIN LINE
CHARACT: A White Cornish line selected since 1979 for low-food conversion ratio while being fed a normal diet. Same origin as item 158.
SOURCE: 22,

160 BRWINOW MEAT TYPE STRAIN
CHARACT: Synthetic strain derived from crosses between dominant White Cornish, White Cornish, White Leghorn and Rhode Island Red. This strain started in 1962. It is maintained as a closed flock, pedigree mated using 30 males and about 300 females per generation. Selected for conformation especially for breast angle. Eight week body weights are 1.4-1.7 kg for males and 1.2-1.4 kg for females, according to the line. Homozygous for the *I* gene and the genes for rapid feathering (k^+, T^+) Moderately resistant to Marek's disease.
SOURCE: 39,

161 UPPSALA LINE I_H
CHARACT: Derived from Line I_1 (item 134) and Line I_2 (item 135) in 1978. Selected for protein utilization in a feed (H) with a fairly high protein content (about 16%).
SOURCE: 45,

162 UPPSALA LINE I_L
CHARACT: Derived from Line I_1 (item 134) and Line I_2 (item 135) in 1978. Selected for protein utilization in a feed (L) with a fairly low protein content (about 13%).
SOURCE: 45,

163 UPPSALA LINE R_L
CHARACT: A Rhode Island Red line selected for protein utilization in a feed (L) with a fairly low protein content (about 13%) since 1978.
SOURCE: 45,

164 UPPSALA LINE R_{L^-}
CHARACT: A Rhode Island Red line selected for protein utilization in a feed (L-) with a very low protein content (about 11%) since 1978.
SOURCE: 45,

HISTOCOMPATABILITY LINES

165 FAVROLM MHC LINES
CHARACT: Three White Leghorn lines derived from the Scandinavian Control population (item 7), outbred and segregating on respectively *Ea-B^{15}/Ea-B^{19}*, *Ea-B^{15}/Ea-B^{21}* and *Ea-B^{19}/Ea-B^{21}*.
SOURCE: 22,

166 WELLCOME MHC LINE B^{14}
CHARACT: A White Leghorn line. Homozygous for MHC type *Ea-B^{14}* This line is divided into four congenic sublines each homozygous for a combination of the immunoglobulin allotypes *IgG^a*, *IgG^g*, *IgM^a* and *IgM^b*. The four sublines are therefore: *IgG^a*, *IgM^a*; *IgG^g*, *IgM^b*; *IgG^a*, *IgM^a*; *IgG^a*, *IgM^b*.
SOURCE: 48,

167 PRAGUE LINE CB
CHARACT: A White Leghorn line that originated from Reaseheath line C in 1964 as a syngeneic line with haplotype B^{12}. Congenic with line CC (item 168) and is resistant to progressive growth of RSV-induced tumors.
SOURCE: 1, 21,

168 PRAGUE LINE CC
CHARACT: A White Leghorn line that originated from Reaseheath line C in 1964 as a syngeneic line with haplotype B^4. Congenic with line CB (item 167) and is susceptible to progressive growth of RSV-induced tumors.
SOURCE: 1, 21,

169 PRAGUE LINE CB.I-B7
CHARACT: A White Leghorn line that arose by transfer of the B^7 haplotype of the IC line to the CB line. Congenic to the CB line (item 167) and intermediate in the response to RSV challenge.
SOURCE: 1, 21,

170 PRAGUE RECOMBINANT LINE CB.R1
CHARACT: A White Leghorn line that arose on the basis of a recombinant observed in the progeny of a (CB X CC) X WB cross. The recombinant B-haplotype is B^{12r1} (*B-F^{12}*, *B-G^4*), is homogeneous in erythrocyte and transplantation antigens and is resistant to RSV challenge.
SOURCE: 21,

171 PRAGUE RECOMNINANT LINE CC.R1
CHARACT: A White Leghorn line that arose on the basis of a recombinant observed in the progeny of a (CB X CC) X WB cross. The recombinant B-haplotype is B^{4r1} (*B-F^4*, *B-G^{12}*), and is homogeneous in erythrocyte and transplantation antigens and is susceptible to RSV challenge.
SOURCE: 21,

172 PRAGUE RECOMBINANT LINE CC.R2
CHARACT: A White Leghorn line that arose on the basis of a recombinant observed in the progeny of a (CC X CB.I-B7) X CB cross. The recombinant B-haplotype is B^{4r2} (*B-F^4*, *B-G^7*). This is homogeneous in erythrocyte and transplantation antigens and is susceptible to RSV challenge.
SOURCE: 21,

173 PRAGUE LINE WA
CHARACT: A Cuckoo Leghorn line which originated from the Reaseheath WA line in 1962. Carries the B^9, haplotype and is congenic in the *B* locus with line WB (item 174). Differs in its response to RSV challenge from that of line WB.
SOURCE: 21,

174 PRAGUE LINE WB
CHARACT: A Cuckoo Leghorn line which originated from the Reaseheath WA line in 1964. Carries the B^{15} haplotype and is congenic in the *B* locus with line WA (item 173). Differs in its response to RSV challenge from that of line WA.
SOURCE: 21,

175 PRAGUE LINE IA
CHARACT: A White Leghorn line which originated from the Reaseheath IA line in 1964. Carries the B^7, haplotype and is congenic with line IC (item 176) in the A blood group (*Ea-A^{13}/Ea-A^{13}*).
SOURCE: 21,

176 PRAGUE LINE IC
CHARACT: A White Leghorn line which originated from the Reaseheath IA line in 1966. Carries the B^7, haplotype and is congenic with line IA (item 175) in the A blood group (*Ea-A^{14}/Ea-A^{14}*).
SOURCE: 21,

177 PRAGUE LINE M
CHARACT: A Black Minorca line developed in 1963. Carries the B^{21}. haplotype and is divided into two sublines differing at the *Ea-A* system. Subline M5 is $Ea\text{-}A^5$ and M6 is $Ea\text{-}A^6$.
SOURCE: 21,

178 DAVIS LINE UCD-003
CHARACT: An inbred White Leghorn base line, full sib bred since 1956, congenic with 14 lines at the B-blood group system (MHC).
SOURCE: 91, 192,

179 DAVIS LINE UCD-104
CHARACT: A Ceylonese Jungle Fowl x Red Jungle Fowl cross line congenic to line UCD-003 (item 178) through five backcross generations.
SOURCE: 91,

180 DAVIS LINE UCD-253
CHARACT: A White Leghorn inbred line congenic to line UCD-003 (item 178) through five backcross generations followed by one intercrossing and three randombred generations. Carries the B^{18} haplotype.
SOURCE: 91,

181 DAVIS LINE UCD-254
CHARACT: A White Leghorn inbred line congenic to line UCD-003 (item 178) through five backcross generations followed by one intercrossing and three randombred generations. Carries the B^{15} haplotype.
SOURCE: 91,

182 DAVIS LINE UCD-312
CHARACT: A New Hampshire inbred line congenic to line UCD-003 (item 178) through five backcross generations followed by one intercrossing and four randombred generations. Carries the B^{24} haplotype.
SOURCE: 91,

183 DAVIS LINE UCD-313
CHARACT: A White Leghorn inbred line congenic to line UCD-003 (item 178) through two backcross generations. Carries the B^3 haplotype.
SOURCE: 91,

184 DAVIS LINE UCD-314
CHARACT: A commercial Hy-Line White Leghorn line congenic to line UCD-003 (item 178) through three backcross generations. Carries the B^{21} haplotype.
SOURCE: 91,

185 DAVIS LINE UCD-316
CHARACT: A Wisconsin New Hampshire inbred line congenic to line UCD-003 (item 178) through five backcross generations followed by one intercrossing and two randombred generations.
SOURCE: 91,

186 DAVIS LINE UCD-330
CHARACT: An Australorp inbred line congenic to line UCD-003 (item 178) through five backcross generations followed by one intercrossing and four randombred generations. Carries the B^{21} haplotype.
SOURCE: 91,

187 DAVIS LINE UCD-331
CHARACT: A dwarf White Leghorn line congenic to line UCD-003 (item 178) through five backcross generations followed by one intercrossing and four randombred generations. Carries the B^4 haplotype.
SOURCE: 91,

188 DAVIS LINE UCD-333
CHARACT: A Red Jungle Fowl inbred line congenic to line UCD-003 (item 178) through five backcrosses followed by one intercrossing and two randombred.
SOURCE: 91,

189 DAVIS LINE UCD-335
CHARACT: A commercial Richardson Mt. Hope White Leghorn line congenic to line UCD-003 (item 178) through five backcross generations followed by one intercrossing and four randombred generations. Carries the B^{19} haplotype.
SOURCE: 91,

190 DAVIS LINE UCD-336
CHARACT: A Red Jungle Fowl inbred line congenic to line UCD-003 (item 178) through five backcross generations followed by one intercrossing and four randombred generations. Carries the B^{21}-like haplotype.
SOURCE: 91,

191 DAVIS LINE UCD-342
CHARACT: A Ceylonese Jungle Fowl X Red Jungle Fowl cross line congenic to line UCD-003 (item 178) through five backcross generations followed by one intercrossing.
SOURCE: 91,

192 DAVIS LINE UCD-396
CHARACT: A New Hampshire X White Leghorn Synthetic inbred line congenic to line UCD-003 (item 178) through five backcross generations followed by one intercrossing and two randombred generations.
SOURCE: 91,

193 IOWA LINE GH
CHARACT: White Leghorn line of about 90% inbred. This line used extensively in skin transplatation. Segregates at *Ea-B* and *Ea-C* blood group loci. Originally a commercial line developed by Ghostley Poultry Breeders.
SOURCE: 123,

194 IOWA LINE HN
CHARACT: White Leghorn line of about 95% inbred. Has been used for skin grafting. Segregates at *Ea-B* blood group locus. Obtained as a "pure" Kimber line before strain-crossing era.
SOURCE: 123,

FERTILITY STRAINS

195 FERTILITY OF FROZEN SEMEN STRAIN
CHARACT: A meat-type strain has been selected for over six generations for increased fertility of frozen semen. When tested against the control line following the third generation, the selected line showed significant improvement over the control in duration of fertility, percent fertility to eight days, percent hens fertile and percent fertility during the duration of fertility. Heritability of this trait was calculated to be about 0.12.
REF: Poultry Science 56:1168-1177, 1977.
SOURCE: 18,

196 MACDONALD MEAT-TYPE CONTROLS
CHARACT: An unselected meat-type strain maintained as a control for the frozen semen strain (item 195).
SOURCE: 18,

PHYSIOLOGICAL STRAINS

197 MUSCULAR DYSTROPHIC STRAIN 307 (NEW HAMPSHIRE)
CHARACT: Started in 1958 and maintained as a closed flock. The breast muscle is atrophied and has a high fat content in this strain.
REF: American Journal of Pathology 70:273-276, 1973.
SOURCE: 92,

198 MUSCULAR DYSTROPHIC STRAIN 413 (NEW HAMPSHIRE)
CHARACT: Started in 1972 by crossing original dystrophic strain 304 with an external strain of randombred New Hampshire hens. The F_2 generation from this cross produced both the homozygous dystrophic strain 413 and a normal strain 412 (item 199) which is available as a control. Strain 413 (dystrophic) is selected for early onset, i.e. inability to rise from a prone position.
REF: Annals of the New York Academy of Sciences 317:224-246, 1979.
SOURCE: 92,

199 NORMAL STRAIN 412 (NEW HAMPSHIRE)
CHARACT: Origin similar to strain 413 (item 198) and used as a control for dystrophic strain 413.
SOURCE: 92,

200 MUSCULAR DYSTROPHIC STRAIN 433 (WHITE LEGHORN)
CHARACT: Produced by crossing original dystrophic New Hampshire Strain 394 with White Leghorn Davis Line UCD-3 (item 178) followed by five generations of back crosses onto inbred strain UCD-3 (item 178). Davis Line UCD-3 serves as a normal control for this line.
REF: Annals of the New York Academy of Sciences 317:224-246, 1979.
SOURCE: 92,

201 NIBS LINE NH-413–MUSCULAR DYSTROPHIC
CHARACT: Muscular dystrophic New Hampshire line obtained from University of California Davis in 1976. Maintained as randombred in closed colony.
SOURCE: 34,

202 NIBS LINE NH-412
CHARACT: New Hampshire line obtained from University of California Davis in 1976. Maintained as randombred in closed colony. Control line for NIBS Line NH-413 (item 201).
SOURCE: 34,

203 NIBS LINE GSN/2am
CHARACT: Muscular dystrophic line which was developed by the introduction of the *am* gene from the muscular dystrophic strain 413 (item 198) to the GSN/2 strain (item 29). Grading to the GSN/2 strain (cross-intercross) was carried out five times. Seems to be fixed for most blood group loci by immune sera but not identified.
SOURCE: 34,

204 MUSCULAR DYSTROPHY STRAIN *(am/am)*
CHARACT: White Leghorn X New Hampshire base, homozygous for the *am* gene. Originated from the University of Connecticut.
SOURCE: 16, 20,

205 MUSCULAR DYSTROPHY STRAIN *(Am^+/am, am/am)*
CHARACT: White Leghorn X New Hampshire base (item 204) backcrossing to New Hampshire to provide segregation of the mutant (*am*) and normal (Am^+) alleles. Derived from University of Connecticut stock.
SOURCE: 20,

206 HYPERURICEMIC AND ARTICULAR GOUT STRAIN (HUA)
CHARACT: A closed pedigreed stock, selected for high levels of uric acid in blood plasma at six months of age. The uric acid level for six-month old males is 19.8 mg % and for seven and one-half month old females is 14.4 mg %. This stock is homozygous for the *dw* gene (item 388).
REF: American Journal of Physiology 223:525-530, 1972.
SOURCE: 188,

207 LOW UREMIC AND ARTICULAR GOUT STRAIN (LUA)
CHARACT: The strain was developed as a control within the HUA stock (item 206) simply by selecting, starting with a random mating in 1969, for low rather than high levels of uric acid. Full pedigree mating was started in 1970. When fed diets high in protein (60% or more) none develop articular gout. The uric acid level for six-month old males is 7.2 mg % and for seven and one-half-month old females is 5.0 mg %. This stock is homogzygous for the *dw* gene (item 388).
REF: American Journal of Physiology 223:525-530, 1972.
SOURCE: 188,

208 CORNELL OBESE STRAIN (OS)
CHARACT: A pedigree bred White Leghorn obese strain which is characterized by changes in phenotype due to a decrease in thyroxine, histological damage to the thyroid gland and the presence in the serum of antibodies to thyroglobulin. About 88% of the males and 93% of the females show the phenotypic evidence of hypothyroidism.
SOURCE: 190,

209 INNSBRUCK OBESE STRAIN (OS)
CHARACT: Obtained in 1970 from stock developed by R.K. Cole (item 208). Has been maintained as a randombred in closed colony with the selection for the autoantibodies against thyroglobulin. In 1982 divided into sublines with B^5, B^{13} and B^{15} haplotypes respectively. The disease, spontaneously arising thyroiditis, resembles the human Hashimoto's disease.
SOURCE: 2,

210 DELAYED AMELANOSIS LINE (DAM LINE)
CHARACT: A line of chickens which is characterized by a high incidence of delayed-appearing feather amelanosis (item 448) and blindness (item 353) and low incidence of autoimmune thyroiditis (item 358) and feathering defect (item 426). The line originated from matings of normal males and two unrelated amelanotic females. The incidence of amelanosis in the F_2 generation was 5%. Three additional generations of DAM X DAM matings increased the incidence to 85.6%. In addition, 39.6% of the amelanotics are blind, a trait never observed in the pigmented birds of this line.
SOURCE: 144,

211 DOUBLE OVIDUCT LINE
CHARACT: A closed flock in which about 96% of the females possess a persistent right oviduct. Seventy-four percent have both a complete left and right oviduct, however in 10% of them the right one is nonfunctional due to constriction at the isthmus-magnum junction. Another 22% have an incomplete right oviduct, missing the center section.
SOURCE: 255,

212 EGG-SHELL QUALITY LINES
CHARACT: Two White Leghorn lines which have been divergently selected for thick- and thin-shells. These lines show significant differences in the amount of shell deposited as measured by percent shell, shell thichness, specific gravity, and resistance to breakage. The differences in eggshell quality are due to different rates of shell deposition.
SOURCE: 132,

213 RHODE ISLAND RED STRAIN (R^+)
CHARACT: A Rhode Island Red strain that has been selected for high residual feed consumption of adult birds.
SOURCE: 24,

214 RHODE ISLAND RED STRAIN (R^-)
CHARACT: A Rhode Island Red strain that has been selected for low residual feed consumption of adult birds.
SOURCE: 24,

215 VIRGINIA ANTIBODY STRAINS
CHARACT: Lines of White Leghorns, originating from the Cornell Randombred population, which have undergone over 10 generations of divergent selection for antibody response 5 days after receiving sheep red blood cell antigen(s).
SOURCE: 247,

FREE RANGE STRAINS

216 FERAL BANTAM
CHARACT: A specialized research strain initiated in 1965 by allowing free-choice mating between Red Junglefowl and pedigree bantams of several varities including Rhode Island Red, Silver Duckwing Old English Game, Cochins, Sebrights and Mille-Fleurs. Since 1968, two lines have been established: (1) a control line is propagated as 40 sires mass mated to 40 females annually; (2) cohorts of 20-80 birds from the control line are periodically released into selected barnyard and/or bottomland hardwood swamp forest habitats of the southeast. The last 5% of all birds to survive from each of these releases are retrapped and returned to captivity where they are used as a mass-mated "survivors" line. Comparisons of these two lines are used to infer the effects of natural selection from factors such as predators, parasites, climate and disease. These birds are also used to monitor the biological availability of radionuclides and other environmental contaminants under natural conditions.
SOURCE: 238,

217 PARTRIDGE POLISH GREENLEG STRAIN
CHARACT: This is the only existing Polish native breed of chicken. It is a rather medium size bird with single comb, pigmented skin, reseda green legs and a plumage pattern resembling that of the Red Jungle Fowl. Its important advantages are resistance to low environmental temperatures and ability to find food on the run. Adaptation of the breed to primitive conditions has mainly developed during many generations of natural selection, when living in severe environment of extensive farming. The breed transmits its advantageous traits when crossed with other breeds or strains.
SOURCE: 40,

JAPANESE QUAIL

(Coturnix coturnix japonica)

RANDOMBRED CONTROL STRAINS

218 ATHENS RANDOMBRED CONTROL
CHARACT: This randombred control quail population was developed in 1963. It is maintained on a pedigree basis with 120 individual paired matings. The white egg-shell color gene is carried in this population.
SOURCE: 114,

219 EDMONTON LINE 101
CHARACT: A randombred, wild-type plumage, quail population.
SOURCE: 6,

220 DAVIS LINE 908
CHARACT: A randombred control strain derived from a cross of an imported Japanese strain with a strain from Taiwan.
SOURCE: 91,

221 OHIO RANDOMBRED CONTROL
CHARACT: A randombred control strain which originated from crosses between the Athens randombred control (item 218), Athens white egg strain and a Wisconsin strain. This strain has been maintained for nine generations with 60 males mated to 250 - 300 females.
SOURCE: 208,

222 VPI RANDOMBRED
CHARACT: This randombred control population originated in 1966 with parental stock obtained from Auburn University. Birds are average body size and lay pigmented eggs.
SOURCE: 246,

223 WFM/Nga STRAIN
CHARACT: Originated from wild Japanese quail captured at the foot of Mt. Fuji in 1965-1970 and domesticated at the National Institute of Genetics (Mishima, Japan) and then transferred to Laboratory of Animal Genetics, Nagoya University in 1981. Mating system: intra-strain rotational crossings.
SOURCE: 35,

BODY WEIGHT STRAINS

224 ATHENS P-LINE
CHARACT: This strain has been selected for 70 generations for increased 4-week body weight. It is currently approximately 150% larger than the base population from which it was derived.
SOURCE: 114,

225 ATHENS T-LINE
CHARACT: This strain has been selected for 70 generations under a low protein and thiouracil stress diet for increased 4-week body weight. This population is resistant to the growth depressing affect of up to 0.2% thiouracil.
SOURCE: 114,

226 DESCHAMBAULT WILD-TYPE FEMALE LINE
CHARACT: Commercial origin. Under mass selection for body weight at six weeks of age. Wild-type plumage.
SOURCE: 19,

227 DESCHAMBAULT BROWN FEMALE LINE
CHARACT: Commercial origin, from the same stock as wild-type female line (item 226). Under mass selection for body weight at six weeks of age. Brown plumage.
SOURCE: 19,

228 DESCHAMBAULT WILD-TYPE MALE LINE
CHARACT: Commercial origin, not related to Deschambault female lines (item 226). Under mass selection for body weight at six weeks of age. Wild-type plumage.
SOURCE: 19,

229 OHIO HW & LW LINES
CHARACT: Long-term lines divergently mass selected from randombred control (item 221) for 4-week body weight. Presently in 13th generation of selection. Body weight of HW line is approximately double that of the LW line. Lines are maintained with 36 pairs of parents.
SOURCE: 208,

230 GEORGIA GIANT BROILER QUAIL-BREEDER LINES
CHARACT: Male and female lines for the prodution of the Georgia giant broiler quail (item 231). Wild-type plumage color.
SOURCE: 118,

231 GEORGIA GIANT BROILER QUAIL
CHARACT: The progeny from crossing male and female lines selected for giant body size (item 230). Average mature body weight is 10. 5 oz. Wild-type plumage color.
SOURCE: 118,

232 GIANT PHARAOH QUAIL
CHARACT: A wild-type plumage color strain of quail selected for large size.
SOURCE: 257,

233 GIANT WHITE BROILER QUAIL
CHARACT: A white plumage color strain of quail selected for large size.
SOURCE: 257,

EGG SHELL COLOR STRAINS

234 NIBS LINE WE
CHARACT: A randombred white egg-shell strain established in 1972.
SOURCE: 34,

235 UBC-WE (WHITE EGG) LINE
CHARACT: Autosomal recessive white egg-shell strain. Acquired from University of Saskatchewan in 1983. Closed flock bred, 3 generations per year.
SOURCE: 7,

DISEASE CONTROL STRAIN

236 BRWINOW JAPANESE QUAIL
CHARACT: Closed since 1973. Bred for 12 generations from crosses between three Polish outbred lines. Selected for 12 generations for resistance to Newcastle disease. Has been resistant to Newcastle disease from the third generation.
SOURCE: 39,

237 HOUGHTON JAPANESE QUAIL
CHARACT: Closed since 1962, 43rd generation since import of hatching eggs from a single source, a commercial breeder. Susceptible to infection with lymphoid leukosis virus of E sub-group, and shows variable susceptibility to A sub-group. Resistant to infection with lymphoid leukosis virus of B, C and D sub-groups.
SOURCE: 48,

238 LIVERPOOL SPF STRAIN
CHARACT: A specific pathogen free strain of quail.
SOURCE: 47,

MUTANT GENE POOL STRAIN

239 QUAIL GENE POOL – FRANCE
CHARACT: This population segregating for the sex-linked albino, *al* , gene (item 482) and an autosomal dominant black plumage color mutant, *D* , (item 489). It is being studied for the blood group genes at four loci, one of these being quite complex.
SOURCE: 25,

240 NIBS LINE PNN
CHARACT: Established in 1972 and maintained as randombred in closed colony. Homozygous for blood group system with following loci by lectins: pn^+/pn^+ (item 472), *Sn/Sn* (item 474), and ns^+/ns^+ (item 471).
SOURCE: 34,

241 NIBS LINE SBP
CHARACT: Established in 1973 by pedigree breeding and has been maintained to date as randombred in closed colony. Homozygous for blood group system by soybean lectin (sn^+/sn^+) (item 474). Homozygous for the autosomal plumage color panda gene, *s* , (item 486). SBPP and SBPH lines were established in 1984 from the SBP line.
SOURCE: 34,

242 NIBS LINE AWE
CHARACT: Estalished in 1975. A randombred white egg-shell strain. Homozygous for the sex-linked albino, *al*, gene (item 482).
SOURCE: 34,

243 NIBS LINE CWE
CHARACT: Established in 1974. A randombred white egg-shell stain. Homozygous for blood group systems with following loci by lectins: *Ns/Ns* (item 471), *Sn/Sn* (item 474) and ht^+/ht^+ (item 470). Homozygous for *Es-D*^{a} isozyme of red blood cells. Homozygous for sex-linked cinnamon plumage color gene, al^c , (item 484).
SOURCE: 34,

244 NIBS LINE YWE
CHARACT: Established in 1974. A randombred white egg-shell strain. Segregating for the autosomal homolethal yellow plumage color gene (item 481).
SOURCE: 34,

245 NIBS LINE MWE
CHARACT: Established in 1975. A randombred white egg-shell strain. Segregating for the sex-linked albino (item 482), sex-linked cinnamon (item 484), autosomal panda (item 486), autosomal dilution (item 491) and autosomal yellow plumage color (item 481) genes.
SOURCE: 34,

246 NIBS LINE CN
CHARACT: Established in 1977. Many quail with idiopathic scoliosis appear in this strain.
SOURCE: 34,

247 NIBS LINE RW
CHARACT: Established in 1976. Glycogen storage disease type II appear in all quail in this strain.
SOURCE: 34,

248 NIBS LINE AMRP
CHARACT: Established in 1974 and maintained as randombred in closed colony. Selected by natural agglutinin for mouse red blood cells. Homozygous for blood group system with following loci by lectins: *Sn/Sn* (item 474) and *Ns/Ns* (item 471). Homozygous for *Es-D*^{a} isozyme of red blood cells. Homozygous for the autosomal plumage color panda *(s)* gene (item 486).
SOURCE: 34,

249 NIBS LINE ACRP
CHARACT: Established in 1974 and maintained as randombred in closed colony. Selected by natural agglutinin for chicken red blood cells. Homozygous for blood group system with following loci by lectins: *Sn/Sn* (item 474) and ns^+/ns^+ (item 471). Homozygous for *Es-D*^{b} isozyme of red blood cells.
SOURCE: 34,

250 NIBS LINE PSN
CHARACT: Established in 1977 and maintained as randombred in closed colony. Selected by natural agglutinin for mouse red blood cells. Homozygous for blood group system with following loci by lectins: *Sn/Sn* (item 474), ps^+/ps^+ (item 473), ht^+/ht^+ (item 470) and ns^+/ns^+ (item 471). Homozygous for *Es-D*^{b} isozyme of red blood cells. Homozygous for the autosomal plumage color panda *(s)* gene (item 486).
SOURCE: 34,

251 NIBS LINE B
CHARACT: Established in 1972 and maintained as randombred in closed colony. Homozygous *(Sn/Sn)* for blood group system by soybean lectin. Homozygous for sex-linked dilution gene, al^D (item 483)
SOURCE: 34,

252 NIBS LINE TKP
CHARACT: Obtained from Takeda Co. in 1983 and maintained as randombred in closed colony. Homozygous for blood group system with following loci by lectins: *Sn/Sn* (item 474) and *Ns/Ns* (item 471). Homozygous for *Es-D^{b}* isozyme of red blood cells.
SOURCE: 34,

253 NIBS LINE CR
CHARACT: Established in 1981 and maintained as randombred in closed colony. Many quail with hereditary nervous disorder appear in this strain.
SOURCE: 34,

254 REB (RED-EYED BROWN) STRAIN
CHARACT: Mutant genes kept: sex-linked cinnamon, *al^{c}* (item 484), and *Amy-2^{B}* (item 476). Mating system: intra-strain rotational crossings with occasional crosses with B strain (item 255).
SOURCE: 35,

255 B (BROWN) STRAIN
CHARACT: Mutant genes kept: sex-linked brown plumage, *br* (item 485) and *Amy-2^{B}* (item 476). Mating system: intra-strain rotational crossings with occasional crosses with REB (item 254) strains.
SOURCE: 35,

256 PDB (PANDA-DOMINANT BLACK) STRAIN
CHARACT: Mutant genes kept: panda plumage , *s* , (item 486), black plumage, *D* , (item 489) and *Amy-2^{A}* (item 475). Mating system: intra-strain rotational crossings .
SOURCE: 35,

257 S (SILVER) STRAIN
CHARACT: Mutant genes kept: silver plumage, *B* , (item 490) and the *Amy-2^{A}* gene (item 475). Mating system: intra-strain rotational crossings with occasional crosses with Y (item 258), W (item 259) and BH (item 260) strains.
SOURCE: 35,

258 Y (YELLOW) STRAIN
CHARACT: Mutant genes kept: yellow plumage, *Y* , (item 481) and *Amy-2^{A}* (item 475). Mating system: intra-strain rotational crossings with occasional crosses with W (item 259) and BH (item 260) strains.
SOURCE: 35,

259 W (WHITE) STRAIN
CHARACT: Mutant genes kept: incomplete dominant white plumage, *W* , (item 488) and *Amy-2^{A}* (item 475). Mating system: intra-strain rotational crossings with occasional crosses with Y (item 258) and BH (item 260) strains.
SOURCE: 35,

260 BH (BLACK AT HATCH) STRAIN
CHARACT: Mutant genes kept: black-at-hatch plumage color, *Bh* , (item 487) and *Amy-2^{A}* (item 475). Mating system: intra-strain rotational and crossings with occasional crosses with Y (item 258) and W (item 259) strains.
SOURCE: 35,

261 UBC-A (WILD TYPE) LINE
CHARACT: Wild-type plumage. Random mating population, 1964 imported, 1968 closed.
SOURCE: 7,

262 UBC-AL (ALBINO) LINE
CHARACT: Sex-linked albino recessive *(al)* (item 482). Random mating population 1978, developed at U.B.C.
SOURCE: 7,

263 UBC B (ALBERTA WILD-TYPE) LINE
CHARACT: Wild-type plumage. Closed random mating population 1977, imported.
SOURCE: 7,

264 UBC-C (CINNAMON) LINE
CHARACT: Autosomal recessive cinnamon (item 492) plumage color line. Plumage is a dilute brown color and birds have red eyes.
SOURCE: 7,

265 UBC-D (DILUTE) LINE
CHARACT: Sex-linked albinotic trait, recessive (item 483). Imperfect eye, feather and skin pigmentation. Closed random mating population 1979, imported.
SOURCE: 7,

266 UBC-DF (DEFECTIVE FEATHERING) LINE
CHARACT: This line carries a feather structure mutant, slow defective feathering (item 503) which is the result of mutations at two separate loci.
SOURCE: 7,

267 UBC-H (BROWN) LINE
CHARACT: Semi-dominant brown plumage (item 478). Closed random mating population 1975. Some selection for increased body weight. Developed at U.B.C.
SOURCE: 7,

268 UBC-J (JUMBO) LINE
CHARACT: Wild-type and brown plumage. Population initiated in 1979. Commercial stock selected for heavy body weight.
SOURCE: 7,

269 UBC-M (BROWN) LINE
CHARACT: Semi-dominant brown plumage (item 478). Closed random mating population 1975, imported.
SOURCE: 7,

270 UBC-NB (WHITE-BREASTED) LINE
CHARACT: This line carries the autosomal resessive gene (item 496) for the white breasted plumage color trait.
SOURCE: 7,

271 UBC-PC (PORCUPINE) LINE
CHARACT: This line carries the autosomal recessive gene (item 500) for the feather structure mutant condition known as porpupine.
SOURCE: 7,

272 UBC-RH (RED HEAD) LINE
CHARACT: This line carries the recessive redhead plumage color gene (item 479) which is allelic to brown. Closed random mating population 1979, imported.
SOURCE: 7,

273 UBC-RT (ROUGH-TEXTURED) LINE
CHARACT: This line carries the autosomal recessive gene (item 501) for the feather structure mutant condition known as rough-textured.
SOURCE: 7,

274 UBC-S (SASKATOON WILD-TYPE)
CHARACT: Wild-type plumage. Acquired from the University of Saskatchewan in 1983. Closed flock bred, 3 generations per year.
SOURCE: 7,

275 UBC-SB (SHORT BARB) LINE
CHARACT: This line carries the autosomal recessive gene (item 502) for the feather structure mutant condition known as short barbs.
SOURCE: 7,

276 UBC-W (WHITE) LINE
CHARACT: Recessive white plumage line (item 480). Closed random mating population 1976, developed at U.B.C.
SOURCE: 7,

277 UBC WILD FERAL LINE
CHARACT: This line developed from 12 feral birds captured in Hawaii in 1985 from a stock released on the island in 1921. Population was open to hunting.
SOURCE: 7,

278 CONNECTICUT QUAIL LINE
CHARACT: This population segregates for various plumage color mutants.
SOURCE: 106,

FERTILITY STRAINS

279 VIRGINIA MATING ABILITY STRAINS
CHARACT: Two strains from a replicated selection experiment. One of the pair of lines was selected for high and the other for low mating ability based on the cumulative number of matings in eight eight-minute observation periods. These strains originated from a random mating population obtained from Auburn University, and now differ by two standard deviations for the selected trait.
SOURCE: 247,

BEHAVIOR STRAIN

280 BONN LINE 1
CHARACT: A quail line originally imported from Ohio State University, USA in 1966 and has been a closed line since then. Pedigreed reproduced with and without selection for a component of dust bathing behavior. Hen egg production averages 265 eggs; average egg weight is 10.2 g and mature body weights are 135 g for females and 110 g for males.
SOURCE: 31,

PHYSIOLOGICAL STRAINS

281 OHIO HP & LP LINES
CHARACT: Long-term lines divergently selected for total plasma phosphorus (a measure of yolk precursor) in the blood at beginning of lay (after two weeks of egg production). Base population was Ohio randombred control (item 221). Females were individually selected while males selected on the basis of their sisters' performance. Plasma phosphorus levels of HP line are more than three times that of the LP line. Lines are maintained with 36 pairs of parents.
SOURCE: 208,

282 LS^+ and LS^- LINES
CHARACT: These quail lines are respectively resistant and sensitive to experimental hyporia.
SOURCE: 25,

283 CORTICOSTERONE RESPONSE LINES
CHARACT: Two quail lines which have been selected divergently for a high and low plasma corticosterone response following stress. The high line's plasma level is approximately 58% greater than the control, whereas the low line has a response approximately 23% less than the control.
SOURCE: 152,

TURKEY

(Meleagris gallopavo)

RANDOMBRED CONTROL STRAIN

284 OHIO RANDOMBRED CONTROL LINE 57
CHARACT: A randombred control started in 1957 from all possible crosses among four large white strains which were commercially popular at the time. Has been maintained with paired matings (36 or greater pairs per generation) since its initiation.
SOURCE: 208,

285 RANDOMBRED CONTROL (66)
CHARACT: This control strain was established in 1966 from two commercial large-bodied white strains. It has an inbreeding coefficient of about 6%.
SOURCE: 208,

EGG PRODUCTIVITY STRAINS

286 OHIO EGG STRAIN
CHARACT: A medium weight strain which has been selected for high egg production for 20 generations. Egg production averages approximately 135 eggs in 180 days without the use of any broody hen management; inbreeding coefficient is about 15%.
SOURCE: 208,

287 DESCHAMBAULT LINE 1
CHARACT: A small white turkey line of commericial origin. Closed flock since 1964. Under family selection for egg numbers in cage housing.
SOURCE: 19,

BODY WEIGHT STRAIN

288 OHIO F STRAIN
CHARACT: A large-bodied strain selected for 14 generations for increased body weight at 16 weeks of age. This strain is a subline of the 1966 randombred control strain (item 285). An inbreeding coefficient of about 10%.
SOURCE: 208,

289 OHIO FL LINE
CHARACT: A subline of the F line (item 288) which was selected for increased shank diameter. Body weight of FL line similar to that of the F line but legs have been significantly increased in size.
SOURCE: 208,

290 DECHAMBAULT LINE 3
CHARACT: A large white turkey line of commercial origin closed since 1957. Under selection for growth traits.
SOURCE: 19,

291 DESCHAMBAULT LINE 4
CHARACT: A large white turkey line of commercial origin. Not related to Line 3 (item 290). Closed flock since 1957. Under selection for growth traits.
SOURCE: 19,

292 NATURAL MATING LINE
CHARACT: Broad Breasted Bronze turkeys with natural-mating ability.
SOURCE: 20, 215,

PHYSIOLOGICAL STRAINS

293 BELTSVILLE PARTHENOGENIC STRAIN
CHARACT: Strain of the Beltsville Small White turkey selected for a high level of parthenogenic development in unfertilized eggs. Well-developed parthenogenic embryos can be expected in 6-12 percent of all unfertilized eggs, of which about 10 percent of these embryos survive to hatching. Parthenogenic embryos and poults are all males and carry the diploid complement of chromosomes.
SOURCE: 91, 203,

294 ESTROGEN STRAINS
CHARACT: The estrogen strains of white turkeys were initiated from the 1966 randombred control strain (item 285) in 1975 by selecting for either high or low plasma level of total estrogen after 23 days of light simulation. On the average this was about 2 days after the first egg. These lines have been selected for five generations.
SOURCE: 208,

DISEASE CONTROL STRAIN

295 SPF FLOCK
CHARACT: A small flock of large white turkeys which are specific pathogen-free for mycoplasmas meleagridis, gallisepticum and synoviae.
SOURCE: 47,

FEATHER PIGMENTATION STRAIN

296 SASKATOON COLOR LINE
CHARACT: Derived from Bronze X Silver Auburn to retain sex-linked genes for dark brown (*e*) (item 521) and Narraganset (*n*) (item 517).
SOURCE: 20,

297 OREGON GREY COLORED LINE
CHARACT: A grey-colored turkey line which the grey color appears to be genetically different from greys previously reported for turkeys. This line resembles the Royal Palm coloration.
SOURCE: 215,

"The art of breeding, the art of producing new combinations of genes, rests entirely on the raw materials -- THE MUTATIONS -- as they are provided by nature. The mutations which geneticists isolate and describe thus become at once the tools of theoretical and of applied biology, and the wise craftsman treasures his tools."

Walter Landauer

II. MUTATIONS

CHICKENS

(Gallus domesticus)

IMMUNOLOGICAL MUTATIONS

298 At AGGLUTINOGEN, *At*
INHERIT: Unknown
LINKAGE: Unknown
CHARACT: This gene allows the extracts of the seeds of *Allium tuberosum* to agglutinate the red blood cells of sexually mature females.
REF: Unpublished
SOURCE: 34,

299 Hi AGGLUTINOGEN, *Hi*
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: This gene allows the extracts of the seeds of *Lathyrus cicera* or *Pisum arvense* to agglutinate the red blood cells of sexually mature females. Red blood cells of sexually immature birds of either sex and males of any age which carry the *Hi* gene can be agglutinated by the "Hi" agglutinogen by pretreating the birds with injections of diethylstilbestrol.
REF: Annals of the New York Academy of Sciences 97: 194-204, 1962.
SOURCE: 24, 33, 34,

300 Mp_1 AGGLUTINOGEN, Mp_1
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: This gene allows the lectin of MPA (*Maclura pomifera* agglutinin) to agglutinate the red blood cells of young and adult chickens of both sexes. This agglutinogen disappears in only sexually mature females which carry the dominant Mp_2 gene.
REF: Unpublished
SOURCE: 34,

301 Pn AGGLUTINOGEN, *Pn-1*
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: This gene allows the extracts of the seeds of *Arachys hypogaea* to agglutinate the red blood cells of young and adult chickens of both sexes.
REF: Animal Blood Group Research Information 1: 25-26, 1972.
SOURCE: 34,

302 Pw_1 AGGLUTINOGEN, Pw_1
INHERIT: Sex-linked dominant
LINKAGE: Group V, see section IV
CHARACT: This gene allows the extracts of the seeds of pokeweed *Phytolacca americana* to agglutinate the red blood cells of young and adult chickens of both sexes.
REF: Animal Blood Group Research Information 12: 16-19, 1984.
SOURCE: 34,

303 Pw_2 AGGLUTINOGEN, Pw_2
INHERIT: Sex-linked dominant
LINKAGE: Group V, see section IV
CHARACT: This gene allows the extracts of the seeds of pokeweed *Phytolacca americana* to agglutinate the red blood cells of sexually mature females. So, Pw_2 is deteeted in only sexually mature pw_1/pw_1 females carrying the Pw_2 gene.
REF: Animal Blood Group Research Information 12: 16-19, 1984.
SOURCE: 34,

304 Si AGGLUTINOGEN, *Si*
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: This gene allows the extracts of the seed of parched *Sesanum indicum* to agglutinate the red blood cells of young and adult chickens of both sexes.
REF: Animal Blood Group Research Information 6: 15-16, 1978.
SOURCE: 34,

305 St_1 AGGLUTINOGEN, St_1
INHERIT: Sex-linked dominant
LINKAGE: Group V, see section IV
CHARACT: This gene allows the extracts of rhizomes of *Solanum tuberosum* to agglutinate the red blood cells of embryos, young and adult chickens of both sexes.
REF: Animal Blood Group Research Information 8: 15-17, 1980.
SOURCE: 34,

306 St_2 AGGLUTINOGEN, St_2
INHERIT: Sex-linked dominant
LINKAGE: Group V, see section IV
CHARACT: This gene allows the extracts of rhizomes of *Solanum tuberosum* to agglutinate the red blood cells of sexually mature females. So, St_2 agglutinogen is detected in only sexually mature st_1/st_1 females carrying the St_2 gene.
REF: Animal Blood Group Research Information 7: 24-27, 1979.
SOURCE: 34,

307 Tg_1 AGGLUTINOGEN, Tg_1
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: This gene allows the extracts of the bulbs of *Tulipa gesneriana* to agglutinate the red blood cells of young and adult chickens of both sexes.
REF: Animal Blood Group Research Information 6: 19-20, 1978.
SOURCE: 34,

308 Tg_2 AGGLUTINOGEN, Tg_2
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: This gene allows the extracts of the bulbs of *Tulipa gesneriana* to agglutinate the red blood cells of sexually immature birds of both sexes carrying the Tg_1 gene. But red blood cells of sexually mature females carrying the Tg_2 gene are not agglutinated.
REF: Unpublished
SOURCE: 34,

309 Va AGGLUTINOGEN, *Va*
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: This gene allows the lectin of VAA *(Visum albumin)* to agglutinate the trypsin treated red blood cells of young and adult chickens of both sexes.
REF: Unpublished
SOURCE: 34,

310 IMMUNOGLOBULIN 7S-1 IgG H CHAIN, $IgG\text{-}1^a$
INHERIT: Autosomal codominant; $IgG\text{-}1^a$, $IgG\text{-}1^b$, $IgG\text{-}1^c$, $IgG\text{-}1^g$
LINKAGE: *IgG-1* 3.0 *IgM-1*
CHARACT: A mutant allele at the multiallelic *IgG-1* immunoglobulin 7S-1 IgG heavy chain locus.
REF: Immunogenetics 8: 385-404, 1979.
SOURCE: 48, 91,

311 IMMUNOGLOBULIN 7S-1 IgG H CHAIN, $IgG\text{-}1^b$
INHERIT: Autosomal codominant; $IgG\text{-}1^a$, $IgG\text{-}1^b$, $IgG\text{-}1^c$, $IgG\text{-}1^g$
LINKAGE: *IgG-1* 3.0 *IgM-1*
CHARACT: A mutant allele at the multiallelic *IgG-1* immunoglobulin 7S-1 IgG heavy chain locus.
REF: Immunogenetics 8: 385-404, 1979.
SOURCE: 91,

312 IMMUNOGLOBULIN 7S-1 IgG H CHAIN, $IgG\text{-}1^c$
INHERIT: Autosomal codominant; $IgG\text{-}1^a$, $IgG\text{-}1^b$, $IgG\text{-}1^c$, $IgG\text{-}1^g$
LINKAGE: *IgG-1* 3.0 *IgM-1*
CHARACT: A mutant allele at the multiallelic *IgG-1* immunoglobulin 7S-1 IgG heavy chain locus.
REF: Immunogenetics 8: 385-404, 1979.
SOURCE: 91,

313 IMMUNOGLOBULIN 7S-1 IgG H CHAIN, $IgG\text{-}1^g$
INHERIT: Autosomal codominant; $IgG\text{-}1^a$, $IgG\text{-}1^b$, $IgG\text{-}1^c$, $IgG\text{-}1^g$
LINKAGE: *IgG-1* 3.0 *IgM-1*
CHARACT: A mutant allele at the multiallelic immunoglubulin 7S-1 IgG heavy chain locus.
REF: Immunogenetics 8: 385-404, 1979.
SOURCE: 48,

314 IMMUNOGLOBULIN 17S-1 IgM H CHAIN, $IgM\text{-}1^a$
INHERIT: Autosomal codominant; $IgM\text{-}1^a$, $IgM\text{-}1^b$
LINKAGE: *IgM-1* 3.0 *IgG-1*
CHARACT: A mutant allele at the multiallelic immunoglobulin 17S-1 IgM heavy chain locus.
REF: Immunogenetics 8: 385-404, 1979.
SOURCE: 48,

315 IMMUNOGLOBULIN 17S-1 IgM H CHAIN, $IgM\text{-}1^b$
INHERIT: Autosomal codominant; $IgM\text{-}1^a$, $IgM\text{-}1^b$
LINKAGE: *IgM-1* 3.0 *IgG-1*
CHARACT: A mutant allele at the multiallelic immunoglobulin 17S-1 IgM heavy chain locus.
REF: Immunogenetics 8: 385-404, 1979.
SOURCE: 48,

BLOOD GROUP MUTATIONS

316 ERYTHROCYTE ALLOANTIGEN A, $Ea\text{-}A^{1\text{-}7}$
INHERIT: Autosomal codominant
LINKAGE: Group III, see section IV
CHARACT: The A blood group of the chicken has 7 alleles. Lines identified by alleles at the *Ea-A* locus are listed below.
REF: Genetics 35:633-652, 1950.
SOURCE: See items 11, 74-82, 97, 98, 175-177.

317 ERYTHROCYTE ALLOANTIGEN B, $Ea\text{-}B^{1\text{-}30}$
INHERIT: Autosomal codominant
LINKAGE: Group X, see section IV.
CHARACT: The B blood group of the chicken has 30 alleles. It is associated with the MHC. Lines identified by alleles at the *Ea-B* locus are listed below.
REF: Genetics 35:633-652, 1950.
SOURCE: See items 11, 25, 27, 31, 33, 37, 38, 43, 46, 48, 62, 74-82, 91, 97-101, 165-194.

318 ERTYHROCYTE ALLOANTIGEN C, $Ea\text{-}C^{1\text{-}8}$
INHERIT: Autosomal codominant
LINKAGE: Group III, see section IV
CHARACT: The C blood group of the chicken has 8 alleles. Lines identified by alleles at the *Ea-C* locus are listed below.
REF: Poultry Science 42:1096-1103, 1963.
SOURCE: See items 11, 44, 47, 74-82, 97-100, 193.

319 ERYTHROCYTE ALLOANTIGEN D, $Ea\text{-}D^{1\text{-}5}$
INHERIT: Autosomal codominant
LINKAGE: Unknown
CHARACT: The D blood group of the chicken has 5 alleles. Lines identified by alleles at the *Ea-D* locus are listed below.
REF: Poultry Science 42:1096-1103, 1963.
SOURCE: See items 26, 48, 74-82, 97, 98.

320 ERYTHROCYTE ALLANTIGEN E, $Ea\text{-}E^{1\text{-}11}$
INHERIT: Autosomal codominant
LINKAGE: Group III, see section IV
CHARACT: The E blood group of the chicken has 11 alleles. Lines identified by alleles at the *Ea-E* locus are listed below.
REF: Genetics 44:955-965, 1959.
SOURCE: See item 11.

321 ERYTHROCYTE ALLOANTIGEN H, *Ea-H*$^{1-3}$
INHERIT: Autosomal codominant
LINKAGE: Group III, see section IV
CHARACT: The E blood group of the chicken has 3 alleles. Lines identified by alleles at the *Ea-H* locus are listed below.
REF: Annals of the New York Academy of Science 97:173-183, 1962.
SOURCE: See items 74-82, 97, 98.

322 ERYTHROCYTE ALLOANTIGEN I, *Ea-I*$^{1-8}$
INHERIT: Autosomal codominant
LINKAGE: Unknown
CHARACT: The I blood group of the chicken has 8 alleles. Lines identified by alleles at the *Ea-I* locus are listed below.
REF: Annals of the New York Academy of Science 97:173- 183, 1962.
SOURCE: See items 74-82, 97, 98.

323 ERYTHROCYTE ALLOANTIGEN J, *EA-J*$^{1-2}$
INHERIT: Autosomal codominant
LINKAGE: Group III, see section IV
CHARACT: The J blood group of the chicken has 2 alleles. Lines identified by alleles at the *Ea-J* locus are listed below.
REF: Annals of the New York Academy of Science 97:173-183, 1962.
SOURCE: Unknown

324 ERYTHROCYTE ALLOANTIGEN K, *Ea-K*$^{1-4}$
INHERIT: Autosomal codominant
LINKAGE: Unknown
CHARACT: The K blood group of the chicken has 4 alleles. Lines identified by alleles at the locus are listed below.
REF: Annals of the New York Academy of Science 97:173- 183, 1962.
SOURCE: See items 11, 74-82, 97, 98.

325 ERYTHROCYTE ALLOANTIGEN L, *Ea-L*$^{1-2}$
INHERIT: Autosomal codominant
LINKAGE: Unknown
CHARACT: The L blood group of the chicken has 2 alleles. Lines identified by alleles at the *Ea-L* locus are listed below.
REF: Genetics 44:14-33, 1959.
SOURCE: See items 74-82, 97, 98.

326 ERYTHROCYTE ALLOANTIGEN P, *Ea-P*$^{1-10}$
INHERIT: Autosomal codominant
LINKAGE: Group III, see section IV
CHARACT: The P blood group of the chicken has 10 alleles. Lines identified by alleles at the *Ea-P* locus are listed below.
REF: Annals of the New York Academy of Science 97:173- 183, 1962.
SOURCE: See items 11, 74-82, 97, 98.

327 ERYTHROCYTE ALLOANTIGEN R, *Ea-R*$^{1-2}$
INHERIT: Autosomal codominant
LINKAGE: Unknown
CHARACT: The R blood group of the chicken has 2 alleles. Lines identified by alleles at the *Ea-R* locus are listed below.
REF: Science 169:1324-1325, 1970.
SOURCE: See items 81, 82.

BIOCHEMICAL MUTATIONS

328 OVALBUMIN A, Ov^A
INHERIT: Codominant; Ov^A, Ov^B
LINKAGE: Ov^A 0.8 G_3
CHARACT: This egg white ovalbumin mutant has a slower migrating electrophoretic mobility than its codominant allele (item 329).
REF: Advances in Genetics 15:147-174, 1970.
SOURCE: 24,

329 OVALBUMIN B, Ov^B
INHERIT: Codominant; Ov^A, Ov^B
LINKAGE: Ov^B 0.8 G_3
CHARACT: This egg white ovalbumin mutant has a faster migrating electrophoretic mobility than its codominant allele (item 328).
REF: Advances in Genetics 15:147-174, 1970.
SOURCE: 24,

330 TRANSFERRIN-COALBUMIN A, Tf^A
INHERIT: Codominant; Tf^A, Tf^B
LINKAGE: Unknown
CHARACT: This serum-transferrin egg-conalbumin mutant has a faster migrating electrophoretic mobility than its codominant allele (item 331).
REF: Advances in Genetics 15:147-174, 1970.
SOURCE: 24,

331 TRANSFERRIN-CONALBUMIN B, Tf^B
INHERIT: Codominant; Tf^A, Tf^B
LINKAGE: Unknown
CHARACT: This serum-transferrin egg-conalbumin mutant has a slower migrating electrophoretic mobility than its codominant allele (item 330).
REF: Advances in Genetics 15:147-174, 1970.
SOURCE: 24,

332 OVOGLOBULIN G_2^A, G_2^A
INHERIT: Autosomal codominant; G_2^A, G_2^B
LINKAGE: Unknown
CHARACT: An egg white ovoglobulin mutant which has a faster migrating electrophoretic mobility than its codominant allele (item 333).
REF: Advances in Genetics 15:147-174, 1970.
SOURCE: 24,

333 OVOGLOBULIN G_2^B, G_2^B
INHERIT: Autosomal codominant; G_2^A, G_2^B
LINKAGE: Unknown
CHARACT: An egg white ovoglobulin mutant which has a slower migrating electrophoretic mobility than its codominant allele (item 332).
REF: Advances in Genetics 15:147-174, 1970.
SOURCE: 24,

334 OVOGLOBULIN G_3^A, G_3^A
INHERIT: Autosomal codominant; G_3^A, G_3^B
LINKAGE: G_3^A 0.8 *Ov*
CHARACT: An egg white ovoglobulin mutant which has a faster migrating electrophoretic mobility than its codominant allele (item 335).
REF: Advances in Genetics 15:147-174, 1970.
SOURCE: 24,

335 OVOGLOBULIN G_3^B, G_3^B
INHERIT: Autosomal codominant; G_3^A, G_3^B
LINKAGE: G_3^B 0.8 *Ov*
CHARACT: An egg white ovoglobulin mutant which has a slower migrating electrophoretic mobility than its codominant allele (item 334).
REF: Advances in Genetics 15:147-174, 1970.
SOURCE: 24,

336 SERUM ALBUMIN, Alb^B
INHERIT: Autosomal codominant
LINKAGE: Unknown
CHARACT: A serum albumin mutant which has a slow electrophoretic migration mobility.
REF: Advances in Genetics 15:147-174, 1970.
SOURCE: 33,

337 SERUM ALKALINE PHOSPHATASE, *akp* (Akp^S)
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A serum alkaline phosphatase mutant which has a slower migrating electrophoretic mobility than its dominant allele (*Akp*) (item 338).
REF: Genetics 53:799-805, 1966.
SOURCE: 24, 33,

338 SERUM ALKALINE PHOSPHATASE, *Akp* (Akp^F)
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: A serum alkaline phosphatase mutant which has a faster migrating electrophoretic mobility than its recessive allele (item 337).
REF: Genetics 53:799-805, 1966.
SOURCE: 24,

339 SERUM AMYLASE-1A, $Amy\text{-}1^A$
INHERIT: Autosomal codominant; $Amy\text{-}1^A$, $Amy\text{-}1^B$
LINKAGE: Unknown
CHARACT: A serum amylase mutant allele. Part of a three allelic series affecting the electrophoretic migration mobility of this enzyme on starch gel electrophoresis.
REF: Japanese Journal of Genetics 45:341-349, 1970.
SOURCE: 24,

340 SERUM AMYLASE-1B, $Amy\text{-}1^B$
INHERIT: Autosomal codominant; $Amy\text{-}1^A$, $Amy\text{-}1^B$
LINKAGE: Unknown
CHARACT: A serum amylase mutant allele. Part of a three allelic series affecting the electrophoretic migration mobility of this enzyme on starch gel electrophoresis.
REF: Japanese Journal of Genetics 45:341-349, 1970.
SOURCE: 24,

341 SERUM ESTERASE-1A, $Es\text{-}1^A$
INHERIT: Autosomal codominant; $Es\text{-}1^A$, $Es\text{-}1^B$, $Es\text{-}1^D$
LINKAGE: Unknown
CHARACT: A serum esterase mutant allele. Part of a three allelic series affecting the electrophoretic migration mobility of this enzyme on starch gel electrophoresis.
REF: Canadian Journal of Genetics and Cytology 10:961-967, 1968.
SOURCE: 33,

342 SERUM ESTERASE-1B, $Es\text{-}1^B$
INHERIT: Autosomal codominant; $Es\text{-}1^A$, $Es\text{-}1^B$, $Es\text{-}1^D$
LINKAGE: Unknown
CHARACT: A serum esterase mutant allele. Part of a three allelic series affecting the electrophoretic migration mobility of this enzyme on starch gel electrophoresis.
REF: Canadian Journal of Genetics and Cytology 10:961-967, 1968.
SOURCE: 33,

343 SERUM ESTERASE-1D, $Es\text{-}1^D$
INHERIT: Autosomal codominant; $Es\text{-}1^A$, $Es\text{-}1^B$, $Es\text{-}1^D$
LINKAGE: Unknown
CHARACT: A serum esterase mutant allele. Part of a three allelic series affecting the electrophoretic migration mobility of this enzyme on starch gel electrophoresis.
REF: Canadian Journal of Genetics and Cytology 10:961-967, 1968.
SOURCE: 33,

NEUROLOGICAL MUTATIONS

344 CONGENITAL QUIVER, *cq*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A neurological defect characterized by continuous tremor at hatching. The defect is not apparent from 2 to 6 weeks of age but is again after that age. These birds do not suffer increased mortality and mature hens develop sexually and lay normal eggs. Affected males never produce semen.
REF: Poultry Science 60:1736, 1981.
SOURCE: 144,

345 EPILEPTIFORM SEIZURES, *epi*
INHERIT: Autosomal recessive, incomplete penetrance
LINKAGE: Unknown
CHARACT: A nervous system mutant which results in epiliptiform seizures somewhat similar to those occuring in man. Seizures occur throughout the birds' life span and appear to be triggered by nervous fatigue. The intensity and duration of the seizures varies within individual birds and may persist up to 30 minutes or more. Normal growth and development do not appear to be impaired if affected birds are provided with a sheltered environment.
REF: Canadian Journal of Physiology and Pharmacology 52:424-429, 1974.
SOURCE: 20,

346 FADED SHAKER, *fs*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A lethal mutation associated with a tremor and pigment dilution. Approximately 50% die in the shell, while those that hatch die within a week or two. Tremors vary from barely noticeable to severe (6 to 10 vibrations/sec). Cerebellar weight is reduced by 8% and there is a marked deficiency of cerebellar myelin.
REF: Journal of Heredity 77:295-300, 1986.
SOURCE: 144,

347 PAROXYSM, *px*
INHERIT: Sex-linked recessive
LINKAGE: Group V, see section IV
CHARACT: A mutant with neurological defects which causes paroxysm, poor growth, stilted gait, and eventual death in hemizygous females. A paroxysm usually follows a sudden auditory or visual stimulation. Death will have occurred by 14-15 weeks of age, if not sooner.
REF: Journal of Heredity 52:47-52, 1961.
SOURCE: 20,

348 PIROUETTE, *plr*
INHERIT: Autosomal recesive
LINKAGE: Unknown
CHARACT: A behavioral trait which affects newly hatched chicks such that they whirl about or pirouette in small circles; each display is short in duration, and the stimuli causing it are unidentified. As the birds grow older, a number also act intermittently as "star gazers". Pirouettes reproduce satisfactorily in matings made by artificial insemination. Pirouette males are much slower to attain sexual maturity than either affected females or normal sibs.
REF: Journal of Heredity 65:124-126, 1974.
SOURCE: 255,

PHYSIOLOGICAL MUTATIONS

349 BLIND, CATARACTS, *bc*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: Chicks are blind at hatch, and cataracts are noticable. The cataracts progress from faint opacities at hatch time to very evident cataracts in adults. It is not allelic with *rc* (item 351), and is not associated with the OH inv (2) percentric inversion.
REF: Poultry Science 65(Suppl.1):14, 1986.
SOURCE: 255,

350 POP-EYE, *pop*
INHERIT: Sex-linked recessive
LINKAGE: Group V, see section IV
CHARACT: This mutant produces a keratoconus. Phenotypically, it is a mild to severe conical protrusion of the cornea. It is first recognizable at about five weeks of age. There do not appear to be any other pathological conditions associated with *pop*.
REF: Journal Heredity 77:123-125, 1986.
SOURCE: 255,

351 BLINDNESS, *rc*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A congenital blindness mutation resulting from a developmental lack of rods and cones in the retina.
REF: Poultry Science 59:2179-2182, 1980.
SOURCE: 7,

352 BLIND, *beg*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: Chicks are blind at hatch. As they mature, turning and circling motions of the head become more pronounced and birds may turn in circles. The overall size of the eyes is larger than sighted control birds. The enlarged globes, extra volume of vitreous and holes in the retina are seen on histological sections.
REF: Biology of Normal and Genetically Abnormal Retinas, Eds. Clayton, R.M. *et al.* pp. 241-247. Academic Press, London, 1982.
SOURCE: 82,

353 RETINAL DYSTROPHY
INHERIT: Unknown
LINKAGE: Unknown
CHARACT: This is an inherited retinal degeneration associated with the DAM line (item 210). Chickens show an early progressive loss of choroidal and pigment epithelial melanin which leads to visual impairment, blindness and severe retinal dystrophy.
REF: Current Eye Research 2:109-115, 1982.
SOURCE: 144,

354 RETINAL DYSPLASIA and DEGENERATION, *rdd*
INHERIT: Sex-linked recessive
LINKAGE: Linkage Group V, see section IV
CHARACT: Progressive deterioration of the retina culminating in blindness by sexual maturity. Gaps in pigment epithelium first detected macroscopically at 9 days of incubation and marked reduction of photoreceptors at 18 days of incubation. After hatching, the thickness of the retina decreases with age due to cell loss from the photoreceptor region and inner nuclear layer. Detachment of atrophic retinas generally occurs by adulthood.
REF: Experimental Eye Research, 37: 337-347, 1983.
SOURCE: 82,

355 DIABETES INSIPIDUS, *di*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: Excessive drinking, as much as three times normal, (polydipsia) and urinary output (polyuria) are characteristics of this mutant. The kidneys of such birds are capable of antiduretic response when either lysine vasopressin or arginine vasotocin are injected. Osmotic pressure and sodium concentration in the plasma of normal and mutant chickens are identical. Chicks predicted to have diabetes insipidus on the basis of parental pedigree are polydipsic.
REF: American Journal of Physiology 222:1167-1152, 1972.
SOURCE: 83,

356 EDEMA
INHERIT: Multifactorial recessive
LINKAGE: Unknown
CHARACT: An embryonic malformation consisting of a fluid filled sac or pair of sacs usually situated dorsally and caudally on either or both thighs of unhatched chicks. The sacs in 16 day embryos are variable in diameter and have reduced number of down follicles on the skin. The edematous condition has been detected in embryos as early as 12 days of incubation and edema is still evident in those chicks alive at hatching.
REF: Poultry Science 65(Suppl.1): 120, 1986.
SOURCE: 215,

357 HEREDITARY AUTOIMMUNE THYROIDITIS
INHERIT: Multifactorial
LINKAGE: Unknown
CHARACT: An obese strain of White Leghorn pedigree bred for nine generations, which is characterized by changes in phenotype due to a decrease of thyroxine, histological damage to the thyroid gland, and the presence in the serum of antibodies of thyroglobulin. About 88% of the males and 93% of the females show phenotypic evidence of hypothyroidism.
REF: Immunology 21:957-966, 1971.
SOURCE: 2, 190,

358 AUTOIMMUNE THYROIDITIS (DAM)
INHERIT: Unknown
LINKAGE: Unknown
CHARACT: A spontaneously occurring hypothyroidism associated with the DAM line (item 210). Histologically the thyroid glands show massive lymphocytic infiltration, establishment of multiple germinal centers and destruction of follicular organization.
REF: Poultry Science 61:1484-1485, 1982.
SOURCE: 144,

359 HEREDITARY URICEMIA AND ARTICULAR GOUT
INHERIT: Multifactorial
LINKAGE: Unknown
CHARACT: A closed pedigreed stock, selected for high levels of uric acid in blood plasma at six months of age. The uric acid level for the second generation was 22.1 mg % for males and 15.4 mg % for females. This stock is homozygous for the *dw* gene (item 388).
REF: American Journal of Physiology 223:525-530, 1972.
SOURCE: 188,

360 MUSCULAR DYSTROPHY, *am*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: This mutant exhibits symptoms similar to those of muscular dystrophy in mammals. Chicks are normal at hatching, but by four weeks of age the pectoral muscles have hypertrophied to the extent that the birds cannot use their wings to fly or to right themselves. In some, atrophy rapidly follows the hypertrophy. Microscopically these changes involve deposition of fat, degeneration of muscle fibers, and fibrosis.
REF: American Journal of Pathology 70:273-276, 1973.
SOURCE: 16, 20, 34, 91, 92, 105,

361 RESTRICTED OVULATOR, *ro*
INHERIT: Sex-linked recessive
LINKAGE: Group V, see section IV
CHARACT: Females lay few or no eggs, and have extremely high levels of cholesterol and triglycerides in the plasma. The outward appearance of the adult females is essentially that of a laying hen with increased fat and some loss of pliability in the abdominal area. The yolks produced are orange colored and translucent and are resorbed after only partial development of the follicle. There are no apparent phenoypic effect in heterozygous males.
REF: Genetics (supplement) 86:43-44, 1977.
SOURCE: 255,

362 RIBOFLAVINURIA, *rd*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: This gene causes a deficiency of riboflavin-binding protein in the albumen and yolks of eggs and in the blood serum. The phenotypic expression of this gene in terms of riboflavin-binding proteins in the albumen and yolk is almost exactly 2(*RdRd*):1(*Rdrd*):0(*rdrd*). Embryos developing in eggs from mutant females die of riboflavin deficiency on or near the 13th day of incubation.
REF: Poultry Science 52:520-530, 1973.
SOURCE: 111,

363 DOUBLE OVIDUCT
INHERIT: Multifactorial, incomplete penetrance
LINKAGE: Unknown
CHARACT: A mutant in which females possess a persistent right oviduct. The right oviducts may vary in length, but in about 74% of the females both the left and right oviducts are complete. Affected birds are in a line (item 211) in which the incidence of the trait is greater than 96%.
REF: Poultry Science 38:1456-1462, 1959.
SOURCE: 255,

364 EXTENDED CROWING
INHERIT: Unknown
LINKAGE: Unknown
CHARACT: Males with this trait have a very long crow. It may last from 9-10 seconds. Birds with this trait are called Musicians, Singers, or Extended Crowers.
REF: Unpublished
SOURCE: Brasilian Musicial Fowl, Koeyoshi, Tomaru, Totenko

365 TUMOR VIRUS b^s, *Tv-B*^{s}
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: This allele confers susceptibility to the leukosis-sarcoma viruses of the B subgroup.
REF: Journal of Virology 1:898-904, 1967.
SOURCE: 152,

EMBRYONIC LETHAL MUTATIONS

366 BLOOD RING, *blr*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: Blood ring describes an early embryonic failure macroscopically detectable at 72 hours of incubation, and is characterized by approximately a 25% reduction in the hatch of fertile eggs. At 72 hours of incubation, the blood ring embryo is reduced in size and reveals the presence of not only blood islands that have not coalesced but also a blood engorged sinus terminalis that is detectable by light candling.
REF: Poultry Science 65(Suppl.1): 119, 1986.
SOURCE: 215,

367 CHONDRODYSTROPHY, *ch*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: Embryos with this trait usually die during the last few days of incubation. They are characterized by extreme shortening of the lower beak and overgrowth of the upper beak. The long bones of the limbs are shortened, and the tibia is nearly always bent. The legs are more extremely affected than the wings.
REF: Journal of Heredity 33:275-283, 1942.
SOURCE: 105,

368 CROOKED-NECK DWARF, *cn*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A lethal condition in which embryos die on the 20th or 21st day. Growth is normal up to about the 11th day of incubation, but is retarded thereafter. At time of death, embryos are characterized by crooked necks and absence or marked reduction of the pectoral and limb muscles.
REF: Journal of Heredity 36:173-152, 1945.
SOURCE: 105,

369 DIPLOPODIA-3, *dp-3*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A lethal in which death occurs prior to hatching. Embryos possess duplicate leg and wing digits, a shortened upper beak and micromelia.
REF: Canadian Journal of Genetics and Cytology 14:417-422, 1972.
SOURCE: 20,

370 DIPLOPODIA-5, *dp-5*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A lethal which results in death between the 19th and 20th days of incubation. Embryos have duplication of leg and wing bones and a reduced upper beak and longer lower beak.
REF: Journal of Heredity 74:341-343, 1983.
SOURCE: 20,

371 LIMBLESS, *ll*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: This mutation results in total amelia. The apical ectodermal ridge is lacking in limbless embryos, however, both the pectoral and pelvic girdles as well as the respiratory and excretory systems are normal. In affected embryos the upper beak is usually shorter than the lower beak.
REF: Journal of Experimental Zoology 209:427-434, 1979.
SOURCE: 255,

372 MICROMELIA ABBOTT, *mm-A*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: Homozygous embryos die early in the third week of incubation. These embryos have a micromelia-like phenotype at that time.
REF: Journal of Experimental Zoology 160:345-354, 1965.
SOURCE: 105,

373 MICROMELIA HAYS, *mm-H*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: An embryonic lethal which causes very short, but straight, long bones of the legs and wings and a shortened beak. About a third of the homozygous embryos will hatch, but they do not survive beyond the first week.
REF: American Naturalist 78:54-58, 1944.
SOURCE: 105,

374 NANOMELIA, *nm*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: This lethal gene causes death towards the end of the incubation period. The condition of the embryos is intermediate between some forms of micromelia and homozygous creeper embryos. Embryos show hypoplasia of the extremities, brachycephaly, and a parrot-like beak.
REF: Journal of Heredity 56:131-138, 1965.
SOURCE: 105,

375 PEROCEPHALY, *per*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A lethal mutant that shows malformations of the head. The phenotype of this mutant varies from a very poorly developed upper beak, associated with blindness, to microcephaly; its most common manifestations are synophthalmia and cyclopia.
REF: Journal of Genetics 54:219-235, 1956.
SOURCE: 105,

376 WINGLESS, *wg-2*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: Wingless embryos survive to the end of the incubation period, but never hatch. Development of the extremities, legs and wings, is defective with wings completely absent.
REF: Journal of Experimental Zoology 132:241-251, 1956.
SOURCE: 105,

377 MISSING UPPER BEAK, *mub*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A facial structure embryonic lethal which causes death on the 12th day of incubation or during hatching. This appears to be a defect in membrane formation which results in the absence of the upper beak and eyelids. Membranous bones of the head are reduced causing the face to be shortened. Cartilaginous bones appear not to be affected.
REF: Journal of Heredity 73:295-296, 1982.
SOURCE: 20,

OTHER EMBRYONIC LETHAL MUTATIONS

CREEPER, *Cp*
INHERIT Autosomal dominant
LINKAGE: Group I, see section IV
CHARACT: See item 382

EAR TUFTS, *Et*
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: See item 399

RIBOFLAVINURIA, *rd*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: See item 362

WHITE-WING LETHAL, *Ww*
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: See item 447

EGG-SHELL-COLOR MUTATIONS

378 BLUE EGG SHELL, *O*
INHERIT: Autosomal dominant
LINKAGE: Group III, see section IV
CHARACT: This mutation produces a blue egg shell, the blue color is not limited only to the shell surface, but prevails throughout the whole shell structure. When the blue mutation is combined with genes for brown shell color, the result is an olive or green shell color.
REF: Journal of Genetics 27:465-470, 1933.
SOURCE: Ameraucana, Araucana, also 10, 20, 24, 26, 27, 106, 157,

379 BROWN EGG SHELL
INHERIT: Multifactorial
LINKAGE: Unknown
CHARACT: Brown pigmentation of egg shells is due to the deposition of protoporphyrin pigment on the outer surface of the shell. Color varies from lightly tinted eggs to extremely dark brown ones. White shell color tends to be dominant over lighter shades of brown. Some genes for color may also be located on the sex chromosome.
REF: Poultry Science 23:259-265, 1944.
SOURCE: See breed descriptions, section V.

380 WHITE EGG SHELL
INHERIT: Multifactorial
LINKAGE: Unknown
CHARACT: Egg shell color is white due to the lack of deposition of a protoporphyrin pigment. White shell color tends to be dominant over brown.
REF: Poultry Science 23:259-265, 1944.
SOURCE: See breed descriptions, section V.

381 PROTOPORPHYRIN INHIBITOR, *pr*
INHERIT: Sex-linked recessive
LINKAGE: Group V, see section IV
CHARACT: This gene inhibits the deposition of the brown protoporphyrin egg shell pigment. Birds carrying this gene produce chalk-white eggs. This gene is associated with the break-reunion of a translocation between chromosome no. 1 and Z chromosome t ($Z\ p^{-};1\ q^{-}$).
REF: Poultry Science 59:1661-1662, 1980.
SOURCE: 157,

SKELETAL MUTATIONS

382 CREEPER, *cp*
INHERIT: Autosomal incomplete dominant
LINKAGE: Group I, see section IV
CHARACT: In heterozygotes this gene produces the short-legged condition known as creeper. It is an embryonic lethal in homozygotes. All the long bones of the limbs are shortened with the tarsometatarsus showing the greatest proportionate reduction.
REF: Storrs (Conn.) Agr. Expt. Sta. Monograph 1 (Revised) and Supplement, 1967, 1973.
SOURCE: Japanese Bantam, also 33, 105, 157,

383 POLYDACTYL, *Po*
INHERIT: Autosomal incomplete dominant, expressivity and penetrance extremely irregular
LINKAGE: Group IV, see section IV
CHARACT: A mutation of the foot in which a "fifth" toe arises from metatarsal number one on the inner side of the foot. This extra digit is a duplication rather than an actual extra toe. Expression of the trait varies considerably, may be asymmetrical or can be suppressed completely.
REF: Journal of Genetics 21:341-366, 1929.
SOURCE: Dorking, Faverolle, Houdan, Silkie, and Sultan, also 144, 157,

384 DOMINANT RUMPLESSNESS, *Rp*
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: Birds with this skeletal mutation lack the pygostyle, all five free caudal vertebrae, the uropygial gland, all the tail feathers and one or two vertebrae. This condition greatly reduces fertility in natural matings due to mechanical difficulties.
REF: Journal of Genetics 20:217-243, 1934.
SOURCE: Rumpless Ameraucana, Rumpless Araucana, and Persian Rumpless, also 105, 106,

385 RECESSIVE RUMPLESSNESS, *rp-2*
INHERIT: Autosomal recessive, low penetrance
LINKAGE: Unknown
CHARACT: This condition is known as "roachback" to the poultryman. The pygostyle and free caudal vertebrae may be absent or fused into a bony knot. The uropygial gland may be absent or rudimentary, with corresponding reduction of tail. The fused caudal vertebrae are bent downward and appear to be laterally compressed. Some birds show kyphoscoliosis and some have supernumerary ribs.
REF: Genetics 30:403-429, 1945.
SOURCE: 105,

386 SNUB NOSE, *sno*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A mutation resulting in a shortening of the head, particularly the beak. Varying degrees of parrot beak are present in a high proportion of the mutants. More severe cases show cross-beaks and a marked reduction in body size.
REF: Unpublished
SOURCE: 144,

BODY-SIZE MUTATIONS

387 AUTOSOMAL DWARFISM, *adw*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A body size mutation which occurred in the Cornell K-strain (item 94). Size is reduced by about 30%, and these birds are recognizable by 6 to 8 weeks of age. Sexual maturity is somewhat delayed with rate of lay about 90% that of the K-strain. Egg size at one year of age is 57 grams and body weight about 1.4 kg. Viability is good but hatchability is poor.
REF: Poultry Science 52:2012-2013, 1973.
SOURCE: 190, 191,

388 SEX-LINKED DWARFISM, *dw*
INHERIT: Sex-linked recessive; *dw*, dw^{M}, dw^{B}, Dw^{+}
LINKAGE: Group V, see section IV
CHARACT: A mutation which reduces body weights of homozygous males by about 43% and those of hemizygous females by 26 to 32%. Chicks are normal size but growth retardation begins by two weeks of age.
REF: World Poultry Science Journal 32:285-304, 1976.
SOURCE: 10, 14, 18, 24, 26, 27, 29, 30, 188, 191, 215,

389 BANTAM DWARFISM, dw^{B}
INHERIT: Sex-linked recessive; *dw*, dw^{M}, dw^{B}, Dw^{+}
LINKAGE: Group V, see section IV
CHARACT: This mutant is thought to be an allele at the Dw^{+} locus and to be different than the *dw* allele (item 388). The evidence is inconclusive as to whether this allele is different or the same as the dw^{M} allele (MacDonald dwarf)
REF: Poultry Science 52:204-210, 1973
SOURCE: Sebright bantam and probably other bantams, also 24,

SKIN-STRUCTURE MUTATIONS

390 **BREDA COMB, *bd***
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: This recessive gene produces a combless bird. Females appear to be completely combless, but two small papillae represent the comb in males. Chickens with any type of comb carry the dominant allele (Bd^+) at this gene locus.
REF: Repts. Evol. Comm. Roy. Soc. IV:18-35, 1908.
SOURCE: Breda

391 **DUPLEX COMB, V-SHAPED, D^V**
INHERIT: Autosomal incomplete dominant; D^V, D^B
LINKAGE: Group IV, see section IV
CHARACT: This gene causes doubling of the posterior end of the comb. The actual phenotype will vary greatly because of its interaction with other comb-type genes, and various non-specific modifier genes. On breeds not carrying other comb genes it appears as two well-defined horn-like sections joined at their base.
REF: Carnegie Institute, Washington, Publication 52, 1906.
SOURCE: Appenzeller, Crevecouer, Dutch Owlbeard, Houdan, La Fleche, Polish and Sultan

392 **DUPLEX COMB, BUTTERCUP, D^B**
INHERIT: Autosomal incomplete dominant; D^B, D^V
LINKAGE: Group IV, see section IV
CHARACT: This gene causes doubling of the whole comb such that appears as a cup surrounded by projections . This phenotype can vary greatly because of its interaction with other comb-type genes, and various non-specific modifier genes.
REF: Carnegie Institute, Washington, Publication 52, 1906.
SOURCE: Sicilian Buttercup

393 **PEA COMB, *P***
INHERIT: Autosomal incomplete dominant
LINKAGE: Group III, see section IV
CHARACT: This mutation causes a small, low comb type. It is marked by three longitudinal rows of papillae or points, the center row being the most conspicuous. In heterozygotes, the central blade is well developed with lateral ridges on both sides. A "breast ridge," a ridge of thickened skin running the length of the body in a mid-ventral line over the keel of the breastbone, is frequently present on pea-combed birds.
REF: American Naturalist 74:382-384, 1940.
SOURCE: Ameraucana, Araucana, Aseel, Brahma, Buckeye, Cornish, Cubalaya, Shamo, Sumatra, and Yokohama, also 10, 20, 24, 144, 157, and see item 395.

394 **ROSE COMB, *R***
INHERIT: Autosomal dominant
LINKAGE: Group I, see section IV
CHARACT: This mutation causes a comb type which is low and of a "water drop" shape, broad in front and pointed in the rear forming a single spike. The surface is covered with small papillae or tubercles. The male's comb and papillae are larger than the female's, and on Mediterranean breeds, this type comb is larger than on other breeds. A pleiotropic association with reduced fertility is characteristic of homozygous rose comb males.
REF: Poultry Science 50:867-869, 1971.
SOURCE: Ancona, Belgian Bearded d'Anvers, Dominque, Dorking, Hamburg, Rosecomb Bantam, Redcap, Rose Comb Leghorn, Rose Comb Rhode Island Red, Rheinlander, Sebright, Watermaal, and Wyandotte, also 24, 157, and see item 395.

395 **WALNUT COMB, *R, P***
(CUSHION OR STRAWBERRY COMB)
INHERIT: Autosomal double dominant
CHARACT: The combined action of the rose comb and pea comb genes produce this comb type which is smaller in size than either the rose or pea comb. This comb type is a low, solid, moderately small comb. Modifier genes produce various surface conformations and variations. The surface of the so-called walnut comb is irregularly furrowed and somewhat uneven. The cushion comb is smooth on top and the front, rear and sides are nearly straight with rounded corners, while the strawberry comb is shaped like and has a surface which somewhat resembles the outer part of half a strawberry. Fertility problems associated with the rose comb gene (item 394) and the "breast ridge" problem associated with pea comb gene (item 393) are also problems associated with the walnut comb.
REF: Canadian Journal of Animal Science 44:184-186, 1964.
SOURCE: Chantecler, Malay, Orloff, and Silkie

396 **TRIPLE SPIKE ROSE COMB**
INHERIT: Unknown
LINKAGE: Unknown
CHARACT: This type rose comb has three spikes in the rear instead of the usual one.
REF: Unpublished
SOURCE: Watermaal

397 **RUGGED COMB, He^+**
INHERIT: Autosomal dominant; He^+, he^l
LINKAGE: Unknown
CHARACT: The most dominant allele of a two allele locus which influences comb appearance. The effect on a rose comb is to give it a granular appearance in day-old chicks and to make it more bulky with more numerous and higher papillae in adults. It also causes single combs to have more points than its recessive allele (item 398).
REF: Annales de Biologie Animale, Biochimie, Biophysique, 5:451-468, 1965.
SOURCE: Rose comb breeds with spikie comb surface.

398 **SMOOTH COMB, he^l**
INHERIT: Autosomal recessive; He^+, he^l
LINKAGE: Unknown
CHARACT: The recessive allele of a two allele locus which influences comb appearance. When homozygous it produces a smooth surface rose comb in day-old chicks and in adults it makes the rose comb less bulky, relatively smooth with few to no papillae. Its influence on a single comb is one of reducing the number of points when compared with its dominant allele (item 397). The penetrance of this allele in chicks is incomplete among males.
REF: Annales de Biologie Animale, Biochimie, Biophysique, 5:451-468, 1965.
SOURCE: Rose comb breeds with smooth comb surface.

399 **EAR TUFTS, *Et***
INHERIT: Autosomal dominant, incomplete penetrance and irregular expressivity.
LINKAGE: Unknown
CHARACT: This trait consists of tufts of feathers attached to skin peduncles which project from the sides of the head in the general area of the ear canal and/or ear lobe. Birds are heterozygous for this trait and therefore do not breed true. Secondary manifestations of the *Et* gene lead to prenatal death for all homozygotes and for about 40% of the heterozygotes. It also modifies the structure and shape of the external auditory canal and middle ear fossa and the location of the tympanic membrane. Expressivity of the ear-tuft trait is quite varied and penetrance is believed to be less than complete.
REF: Journal of Heredity 69:91-96, 1978.
SOURCE: Tufted Araucana

400 ENLARGED EARLOBES--WHITE FACE
INHERIT: Unknown
LINKAGE: Unknown
CHARACT: This mutant type has earlobes which are so greatly enlarged that they fell below the wattles. The white color of the earlobes extends anteriorly to cover all the face. This trait is not seen in young birds, but develops as the birds mature.
REF: Unpublished
SOURCE: White-Faced Black Spanish

401 SLEEPY-EYE, *se*
INHERIT: Autosomal recessive
LINKAGE: Group III, see section IV
CHARACT: This gene affects the mobility of the lower eyelids. Lower eyelids are partially closed at time of hatching, and they remain that way throughout the bird's life. Although this trait is not in itself lethal, it does however function as a subvital by obstructing the vision of chicks with the more severe expression of it.
REF: Journal of Heredity 59:375-378, 1968.
SOURCE: 106,

402 UROPYGIAL, *U*
INHERIT: Autosomal incomplete dominant
LINKAGE: Group I, see section IV
CHARACT: This mutation causes bifurcation of the oil gland papilla in heterozygotes. The degree of bifurcation varies from an almost imperceptible groove in the tip, to complete separation into two papillae. Most homozygotes show only two vestigial papillae and lack the uropygial gland, but few show the heterozygous-type phenotype.
REF: Proc. Intern. Genetic Congr. 6th Congr. 2:96-97, 1932.
SOURCE: 157,

403 MULTIPLE SPURS, *M*
INHERIT: Autosomal dominant
LINKAGE: Group IV, see section IV
CHARACT: Males with this trait have a peculiar multiple spur consisting of a large central spur with a smaller one immediately above it and another one below. In some birds there may be as many as five. In females this trait appears as three flattened and enlarged scales. Chicks of both sexes show the condition as enlarged scales at the normal site of the spur.
REF: Journal of Heredity 32;356-364, 1941.
SOURCE: Sumatra, also 157,

404 SPURRED FEMALES
INHERIT: Unknown
LINKAGE: Unknown
CHARACT: Females as well as males develop spurs as they reach sexual maturity.
REF: Unpublished
SOURCE: 170,

SKIN-COLOR MUTATIONS

405 WHITE SKIN, W^+
INHERIT: Autosomal dominant; W^+, w
LINKAGE: Group III, see section IV
CHARACT: This gene causes the skin, beak, and shanks to be white by preventing the deposition of xanthophyll in these areas. In breeds with dermal melanin (item 409), the shanks are slaty blue. Classification is difficult before six to eight weeks of age.
REF: Poultry Science 7:24-30, 1927.
SOURCE: See breed descriptions, section V.

406 YELLOW SKIN, *w*
INHERIT: Autosomal recessive; W^+, w
CHARACT: This gene causes the deposition of xanthophyll into the skin such that the skin, beak, and shanks of otherwise white-skinned birds are yellow. In breeds with dermal melanin (item 409), the shanks are willow green. Classification is difficult before six to eight weeks of age.
REF: Poultry Science 7:24-30, 1927.
SOURCE: See breed descriptions, section V.

407 SEX-LINK SKIN, *y*
INHERIT: Sex-linked recessive
LINKAGE: Group V, see section IV
CHARACT: A recessive gene on the Z-chromosome which causes white skin. This white skin phenotype is obvious at one day of age. Added amounts of carotenoid pigment in the diet fail to impart yellow color in the shanks of these white-skinned birds.
REF: Journal of Heredity 72:139-140, 1981.
SOURCE: 255,

408 DERMAL MELANIN INHIBITOR, *Id*
INHERIT: Sex-linked dominant; *Id*, id^c, id^+
LINKAGE: Group V, see section IV
CHARACT: This mutation affects shank color by inhibiting the deposition of melanin pigment in the dermis of the shanks. In white-skinned birds (item 405) the shanks are white, and in yellow-skinned birds (item 406) they are yellow. Classification of this trait is difficult in birds under three months of age.
REF: Anatomical Record 31:343-344, 1925.
SOURCE: See breed descriptions, section V.

409 DERMAL MELANIN id^+
INHERIT: Sex-linked recessive; *Id*, id^c, id^+
CHARACT: This gene causes the deposition of melanin pigment in the dermis of the shanks. Thus, in white-skinned birds (item 405) the shanks are slaty blue and in yellow-skinned birds (item 406) the shanks are willow green. Classification of this trait is difficult in birds under three months of age.
REF: Anatomical Record 31:343-344, 1925.
SOURCE: See breed descriptions, section V.

410 FIBROMELANOSIS (BLACK SKIN), *Fm*
INHERIT: Autosomal dominant with multifactorial modifiers.
LINKAGE: Unknown
CHARACT: A mutant in which the skin all over the body is black. The beak and shanks are bluish and the wattles, comb and face are a purplish hue. Pigment is also located in the sheaths of muscles and nerves, in tendons, mesenteries, and blood vessel walls.
REF: Journal of Genetics 19:27-63, 1927.
SOURCE: Silkie, also 144,

411 WHITE EARLOBES
INHERIT: Multifactorial
LINKAGE: Unknown
CHARACT: A skin color trait in which the otherwise red earlobes are white. This trait develops as the birds mature.
REF: Genetics 13:470-487, 1928.
SOURCE: See breed descriptions, section V.

EYE-COLOR MUTATIONS

412 BROWN EYE, *br*
INHERIT: Sex-linked recessive
LINKAGE: Group V, see section IV
CHARACT: Brown eyes in poultry are the result of the presence of certain plumage-color genes in the presence of this sex-linked gene. In its alternate allelic form, Br^+, the eyes would be reddish bay even if necessary plumage-color genes were present.
REF: Genetics 18:210-220, 1933.
SOURCE: See breed and variety descriptions, section V.

413 PEARL EYE
INHERIT: Recessive
LINKAGE: Unknown
CHARACT: This eye color results from the absence of both black and yellow pigments in the anterior layer of the iris. The pigment on the posterior layer of the iris is prevented from showing through the iris by a tissue opacity resulting from colorless opaque granules in the connective tissue cells and the muscle fibers.
REF: Journal of Genetics 9:69-82, 1919.
SOURCE: Cornish, Aseel Game, Shamo Game, Tuzo Game, and Malay.

414 RED EYE
INHERIT: Unknown
LINKAGE: Unknown
CHARACT: This eye color is a deep or bright red and is distinctly a different color than the "wild-type" reddish bay.
REF: Unpublished
SOURCE: America Game, some Modern and Old English Games, La Fleche, Lakenvelder, and Maran.

ALBINISMS
CHARACT: Mutations which produce pink eyes due to complete or partial inhibition of melanin production in the eyes. These birds may be sensitive to bright light. See item 440, Autosomal Albinism, c^a and item 443 Imperfect Albinism, s^{al}

PLUMAGE-DISTRIBUTION MUTATIONS

415 ABNORMAL FEATHERING, *af*
INHERIT: Autosomal Recessive
LINKAGE: Unknown
CHARACT: Normal feathering in chicks but juvenile and adult feathers patchy in distribution and abnormal in structure. Very variable; extreme cases are completely naked but some birds develop new secondaries as adults.
REF: Unpublished
SOURCE: 82,

416 CONGENITAL BALDNESS, *ba*
INHERIT: Recessive
LINKAGE: Unknown
CHARACT: A mutant in which bald spots, lacking feather follicles, develop on top of the head just above the orbits or in the center of the head. These bald spots which are present at hatching time, remain even in adults. Spots can be bilateral or unilateral and can vary from a few follicles to a spot of about half an inch in diameter.
REF: Journal of Morphology 69:517-535, 1941.
SOURCE: 255,

417 NAKED NECK, *Na*
INHERIT: Autosomal dominant
LINKAGE: Group III, see section IV
CHARACT: All pterylae are reduced in size and in some areas are completely absent due to the action of this mutant gene. Feather follicles are absent from the head and neck, except for around the comb, the anterior spinal tract and two small patches on each side above the crop. The lateral breast tracts are greatly reduced while others are reduced to a lesser extent.
REF: Genetics 18:68-82, 1933.
SOURCE: Naked Neck, Transylvanian Naked Neck, and Turken, also 10, 20, 24, 30, 144, 157,

418 OTTAWA NAKED, *nk*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: Chicks are almost totally naked at hatching. Adults may develop a few down feathers but for the most part are totally naked. Associated with the featherless condition is frequent webbing of toes II and III.
REF: Unpublished
SOURCE: 20,

419 PTILOPODY (FEATHERED SHANKS)
INHERIT: Autosomal dominant with multifactorial modifiers (possibly 2 or 3 loci).
LINKAGE: Unknown
CHARACT: This mutation causes growth of feathers on the shanks and toes. The degree and extent of feathering varies greatly among the various breeds that have this trait. There are probably several genetically distinct types of feathering. This condition is often associated with brachydactyly.
REF: Poultry Science 9:51-64, 1929.
SOURCE: Belgian Bearded d'Uncle, Booted Bantam, Brahma, Breda, Cochin, Favorelle, Langshan, Silkie, and Sultan, also 157,

420 SCALELESS, *sc*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: This mutant gene causes retardation of feather follicle formation during embryonic development. Scaleless chicks have smooth, waxy skin, largely free of down feathers; their legs and feet lack scales and foot pads. Scattered feathers are present in the head, humeral, crural, and caudal tracts. Adults have even fewer feathers than the chicks, and males do not develop spurs.
REF: Journal of Experimental Zoology 181:99-110, 1972.
SOURCE: 105,

PLUMAGE-DEVELOPMENTAL-RATE MUTATIONS

421 LATE FEATHERING, *K*
INHERIT: Sex-linked dominant; K^n, K^s, K, k^+
LINKAGE: Group V, see section IV
CHARACT: A dominant allele in a four allelic series which controls the rate of feather development. At one day of age the primary flights and covert feathers are all about the same length. At eight to twelve days of age the tail feathers have not yet developed. Overall feathering is later for these birds than those with the rapid allele (k^+) (item 422). This gene has no effect on adult plumage.
REF: Poultry Science 35:614-616, 1956.
SOURCE: Most of the heavy breeds such as the Brahma, Cornish, Cochin, Rhode Island Red, Wyandotte, Plymouth Rock, Orpington, and others.

422 RAPID FEATHERING, k^+
INHERIT: Sex-linked recessive; K^n, K^s, K, k^+
LINKAGE: Group V, see section IV
CHARACT: The most recessive allele of a four allelic series which controls the rate of feather development. At one day of age the primary flights are much longer than the coverts. At eight to twelve days of age the chicks have developed tails. The chicks completely feather at a much more rapid rate than those with the other three alleles (items 421, 423).
REF: Poultry Science 35:614-161, 1956.
SOURCE: Most of the light breeds such as Leghorns, Minorcas, Anconas, and others.

423 MODIFIED SLOW FEATHERING
INHERIT: Multifactorial
LINKAGE: Unknown
CHARACT: The phenotypic effect of modified slow feathering is to reduce the length of the primary flight feathers at hatching without a concomitant change in the primary coverts. Since the primaries are shorter than the coverts, modified slow feathering superficially resembles rapid feathering (item 422) and can lead to sexing errors. The modified slow feathering genotype has no effect on rapid feathering, k^+ / k^+.
REF: Poultry Science 55:2094, 1976.
SOURCE: 144,

424 TARDY FEATHER GROWTH, *t*
INHERIT: Autosomal recessive
LINKAGE: Group III, see section IV
CHARACT: A mutant gene which affects feather growth, but which can only be detected easily in sex-linked rapid-feathering chicks, k^+ / k^+ or $k^+ / -$ (item 422). Day-old chicks show no secondaries. At ten days of age they lack tails and show little or no development of the secondaries or primaries. Tail feathers do not appear until at least eight weeks of age. At maturity these birds appear normal.
REF: Journal of Heredity 37:197-205, 1946.
SOURCE: 255,

425 DYPLASTIC REMIGES, *dr*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A condition that affects the remiges and rectrices. Between the 8th and 28th day the feather follicles of a variable number of remiges and rectrices become enlarged and blood filled. The tissue of the developing feather becomes necrotic and these feathers are soon lost. Both wings exhibit a similar number of affected remiges while the number of affected rectrices are proportional but lower in number.
REF: Journal of Hereditary 74:101-104, 1983.
SOURCE: 20,

426 DEFECTIVE FEATHERING
INHERIT: Unknown
LINKAGE: Unknown
CHARACT: Abnormal feathering is apparent by 6 to 8 weeks of age. Structural defects appear in the rachis and barbules at the tip of the remiges and rectrices. Later feathering shows varying degrees of delayed or arrested contour remige and rectrice development. In adults, many feathers break off leaving patches of baldness and severely affected birds may be totally denuded.
REF: Poultry Science 62:1442, 1983.
SOURCE: 144,

FEATHER-STRUCTURE MUTATIONS

427 FRIZZING, *F*
INHERIT: Autosomal incomplete dominant
LINKAGE: Group II, see section IV
CHARACT: A mutant gene which causes the contour feathers to curve outward away from the body. In homozygotes the curving is extreme and the barbs are extremely curled so that no feather has a flat vane. Heterozygotes are less extremely affected. Showroom preference is for the phenotype of the heterozygote.
REF: Journal of Genetics 32:277-285, 1936.
SOURCE: Frizzle Fowl, also 10, 20,

428 HEN FEATHERING, *Hf*
INHERIT: Autosomal incomplete dominant, sex-limited
LINKAGE: Unknown
CHARACT: Female chickens develop female-type plumage in the presence of estrogens, whereas, normally, males and castrated chickens of both sexes develop male-type plumage. The henny feathering trait increases the formation of estrogen from andgrogen in the peripheral tissues, thus males of henny feathering breeds develop female-type plumage although they otherwise look and respond as virile males.
REF: Journal of Clinical Investigation 66:57-65, 1980.
SOURCE: Campine and Sebright

429 SILKINESS, *h*
INHERIT: Autosomal recessive
LINKAGE: Group III, see section IV
CHARACT: This mutant has a wooly or silky type of plumage. The feather barbs are unusually long and frequently bifurcated. The barbules are elongated and lack both hamuli and scrolls, thereby providing no means for holding the barbules together.
REF: Journal of Heredity 12:117-128, 1921.
SOURCE: Silkie, also 144,

FEATHER-LENGTH MUTATIONS

430 CREST, *Cr*
INHERIT: Autosomal incomplete dominant
LINKAGE: Group II, see section IV
CHARACT: A crest of feathers develops on top of the head of birds with this gene. These feathers are longer than normal and stand more or less erect. Crests may vary from a few elevated feathers to a very large knob-like structure. This trait is frequently associated with cerebral hernia and modification of the frontal bones of the skull.
REF: American Naturalist 70:379-394, 1936.
SOURCE: Appenzeller, Brenda, Crevecoeur, Houdan, Polish, Silkie, Sultan, also 144, 157,

431 LONG FILOPLUMES, *Lf*
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: Varying numbers of filoplumes in the fluff area are one-half to two inches longer than the adjacent definitive feathers.
REF: Unpublished
SOURCE: 255,

432 NON-LIMITED GROWTH, *Gl* (LONG TAIL)
INHERIT: Dominant
LINKAGE: Unknown
CHARACT: This mutant gene allows a part of the tail and saddle feathers of male chickens to continue to grow. In combination with the *ml* gene (item 433) some Japanese breeds develop tails with average lengths of 7-8 feet.
REF: World's Poultry Science Journal 26:562-568, 1970.
SOURCE: Phoenix, Totenko, and Yokahama

433 NON-MOLT, *ml* (LONG TAIL)
INHERIT: Recessive
LINKAGE: Unknown
CHARACT: This mutant gene allows a part of the tail and saddle feathers of male chickens to grow year after year without molting. In combination with the *Gl* gene (item 432) some Japanese breeds develop tails with average lengths of 7-8 feet.
REF: World's Poultry Science Journal 26:562-568, 1970.
SOURCE: Phoenix, Totenko, and Yokohama

434 MUFFS AND BEARD, *Mb*
INHERIT: Autosomal incomplete dominant, incomplete penetrance
LINKAGE: *Mb* 44.3 *Ea-H*, Group III
CHARACT: This mutant gene causes elongation of feathers at the sides of the face and under the lower beak. Neither occurs without the other, although muffs are usually more evident than the beard. The trait is associated with reduced size of the wattles.
REF: Carnegie Institute, Washington, Publication 52:1906.
SOURCE: Ameraucana, Belgian Bearded Bantam, Crevecoeur, Dutch Owlbeard, Faverolle, Houdan, Orloff, Bearded Polish, Silkie, Sultan, and Tburinger, also 10, 20, 144, 157,

435 VULTURE HOCKS, *v*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A mutant trait characterized by large, stiff feathers developing on the posterior part of the crural feather tract. These feathers project backward beyond the tibio-tarsal joint, a region that is usually characterized by soft, fluffy feathers. This trait appears to be associated with ptilopody (item 419), although the latter often occurs in the absence of the former.
REF: Journal of Heredity 22:147-154, 1931.
SOURCE: Belgian Bearded d'Uncle, Booted Bantam, Breda, and Sultan

PLUMAGE-COLOR MUTATIONS

436 BLUE, *Bl*
INHERIT: Autosomal incomplete dominant
LINKAGE: Unknown
CHARACT: The *Bl* gene alters the normal production of black pigment such that the feathers of heterozygotes are a slaty blue coloration. Feather pigmentation of birds homozygous for this gene is further reduced to a blue-splashed white phenotype, while homozygotes for the recesive allele are black.
REF: American Naturalist 55:289-327, 1921.
SOURCE: Blue Andalusian, and all blue and splash varieties of various breeds. See variety descriptions, section V, also 144,

437 BUFF-RED COMPLEX
INHERIT: Autosomal multifactorial
LINKAGE: Unknown
CHARACT: A feather ground color which can vary from a light buff to dark red. Various intensities of the buff-red complex are characteristic of the different buff and red breeds and varieties.
REF: Poultry Science 44:47-52, 1965.
SOURCE: All breeds and varieties that are not "silver" (*S*) See breed and variety descriptions, section V.

438 DOMINANT WHITE, *I*
INHERIT: Autosomal incomplete dominant
LINKAGE: Group II, see section IV
CHARACT: This mutant gene completely inhibits production of black and reduces red pigments in the feathers of homozygotes. It is less effective in heterozygotes, having almost no effect on red but reducing black to just a few ticks and spots. Chicks are a light yellow.
REF: Journal of Heredity 6:147-151, 1915.
SOURCE: White-Laced Red Cornish, Red Pyle and White Modern Game, Red Pyle Old English Game, Pyle and White Hamburg, White Leghorn, White Minorca, Buff Laced and White Polish and Rhode Island White, also 157,

439 RECESSIVE WHITE, *c*
INHERIT: Autosomal recessive; C^{+}, *c*, c^{re}, c^{a}
LINKAGE: Unknown
CHARACT: The *c/c* genotype, usually results in a phenotypically white adult plumage. Some pigment is usually present microscopically and, in some cases, grey or light red pigment is easily seen throughout the plumage. Chicks vary from light yellow to greyish-white.
REF: Poultry Science 15:169-178, 1936.
SOURCE: White varieties of the following breeds: Cochin, Cornish, Dorking, Frizzle, Japanese Bantam, Jersey Giant, Lamona, Langshan, Orpington, Plymouth Rock, Silkie, Sultan, and Wyandotte, also 24, 144,

440 AUTOSOMAL ALBINISM, c^a
INHERIT: Autosomal recessive; C^+, c, c^{re}, c^a
LINKAGE: Unknown
CHARACT: A recently determined allele at the C^+ locus. This gene, previously designated as *a*, causes complete albinism by inhibiting all pigmentation. Plumage color is white while eyes are a bright red.
REF: Journal of Heredity 24:379-383, 1933.
SOURCE: 144,

441 SILVER, S
INHERIT: Sex-linked dominant; S, s^+, s^{al}
CHARACT: The most dominant of the three plumage-color alleles at the s^+ locus. This gene inhibits the production of red pigment but has no effect on black. Chicks may be white, silver, or black and may have striping, marbling, or other patterns on a white background.
REF: Journal of Experimental Zoology 13:1-26, 1912.
SOURCE: All "silver" varieties as well as many others. See variety descriptions, section V, also 144, 157,

442 GOLD, s^+
INHERIT: Sex-linked recessive; S, s^+, s^{al}
LINKAGE: Group V, see section IV
CHARACT: The second allele of the three plumage-color alleles at the s^+ locus. This gene is necessary for the production of the buff-red pigment complex. Chicks may be buff, red, or black and may have striping, marbling, or other patterns on a buff or red background.
REF: Journal of Experimantal Zoology 13:1-26, 1912.
SOURCE: All "buff, red, brown, and golden" varieties as well as many others. See variety descriptions, section V.

443 IMPERFECT ALBINISM, s^{al}
INHERIT: Sex-linked recessive; S, s^+, s^{al}
LINKAGE: Group V, see section IV
CHARACT: The most recessive of the three plumage-color alleles at the s^+ locus. Feather pigment is reduced, being just faintly visible. Chicks are pink-eyed with down plumage being white, pink, or greyish. The down feathers are also shortened on these chicks.
REF: Journal of Heredity 32:71-80, 1941.
SOURCE: 24, 144,

444 LAVENDER, *lav*
INHERIT: Autosomal recessive
LINKAGE: Group 1, see section IV
CHARACT: This recessive plumage color gene dilutes both the black and red-buff complex pigments. Black becomes a slaty blue and the reds become beige. In some breeds this phenotype is called "self-blue."
REF: Journal of Heredity 63:19-25, 1972.
SOURCE: Porcelain and self-blue varieties of certain breeds. See variety descriptions, section V

445 CREAM, *ig*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A recessive gene which dilutes gold color to a cream color that can vary in shade from reddish-yellow to silver. Some cream-colored birds can easily be confused with brassy silver as they show so little gold.
REF: Journal of Genetics 48:327-332, 1948.
SOURCE: 24, 144,

446 MAHOGANY, *Mh*
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: A mutation resulting in a partial restriction of black pigment in the wild-type phenotype (item 452). Males have breast feathers that are red at base with black markings or spangling. Females have general reduction in black with a pronounced increase in redness.
REF: Poultry Science 45:451-457, 1966.
SOURCE: 144,

447 WHITE-WING LETHAL, *Ww*
INHERIT: Autosomal incomplete dominant
LINKAGE: Unknown
CHARACT: This feather-pigment inhibitor causes partial achromatosis of the red pigments of red columbian-patterned chickens. Males show a greater degree of achromatosis than do the females. This trait is lethal in homozygotes and causes a high pre- and post-hatch mortality among heterozygotes.
REF: Journal of Heredity 70:373-378, 1979.
SOURCE: 106,

448 DELAYED AMELANOSIS
INHERIT: Unknown
LINKAGE: Unknown
CHARACT: Birds with this trait are characterized by a delayed-appearing feather amelanosis and a related visual defect leading to blindess. The onset of the amelanosis is variable with the earliest appearance in juvenile plumage. Eventually there is a complete loss of feather eumelanin and pheomelanin.
REF: American Journal of Pathology 111:197-212, 1985.
SOURCE: 144,

PLUMAGE-PATTERN MUTATIONS

449 EXTENDED BLACK, E
INHERIT: Autosomal incomplete dominant; E, E^R, e^{Wh}, e^+, e^b, e^s, e^{bc}, e^y
LINKAGE: Unknown
CHARACT: The most dominant of a multi-allelic series affecting plumage pattern. Chicks are black, non-striped, with variable tendency to exhibit or show white on ventral areas and wing tips. Adult plumage is solid black or may be black with a secondary feather-pattern superimposed in each feather, such as barring.
REF: Poultry Science 44:89-98, 1965.
SOURCE: All solid black, solid blue, and black varieties with feather patterns such as barred and mottled. See variety descriptions, section V.

450 BIRCHEN, E^R
INHERIT: Autosomal dominant; E, E^R, e^{Wh}, e^+, e^b, e^s, e^{bc}, e^y
LINKAGE: Unknown
CHARACT: The second allele at the E series plumage-pattern locus. Chicks are black with white on the ventral surface and at the wing tips. Adult plumage is basically black with gold or white present on the head and as a wide lace in the hackle. The upper breast is black with a very narrow lacing of gold or white. The primary and secondary flight feathers are black. Adult males also have gold or white on the back, saddle and wing bow feathers.
REF: Poultry Science 51:214-222, 1972.
SOURCE: All the birchen, brown-red, lemon-blue, and silver-blue varieties of various breeds. See variety descriptions, section V.

451 DOMINANT WHEATEN, e^{Wh}
INHERIT: Autosomal dominant; E, E^R, e^{Wh}, e^+, e^b, e^s, e^{bc}, e^y
LINKAGE: Unknown
CHARACT: The third allele at the E series plumage-pattern locus. Chicks are yellowish white but some show narrow remnants of dark striping on the back. Adult males have the "wild-type," e^+/e^+, coloration (item 452). Adult females are salmon colored, showing very little black in the stippled areas of the back. The breast is a pale coloration. This gene interacts with the columbian restriction gene, *Co*, (item 458) to produce the "black-tailed" columbian pattern of the New Hampshire.
REF: Journal of Heredity 61:280-282, 1970.
SOURCE: Salmon Favrolle, New Hampshire, and wheaten varieties of various breeds. See variety descriptions, section V, also 144,

452 WILD-TYPE, e^+
INHERIT: Autosomal recessive; E, E^R, e^{Wh}, e^+, e^b, e^s, e^{bc}, e^y
LINKAGE: Unknown
CHARACT: The fourth allele at the E series. This gene produces the so-called "wild-type". Chicks are olive-fawn ground color with a black longitudinal stripe on head and back, and a broad reddish median dorsal stripe. Adult males are black with red-yellow hackles and saddles, and red wing bows and leading edge of secondaries. Adult females are generally stippled yellow-black with a salmon breast and black primaries and rectrices.
REF: Poultry Science 44:89-98, 1965.
SOURCE: Silver Gray Dorking, Red Jungle Fowl, Golden Leghorn, Light Brown Leghorn, Silver Leghorn, Golden Phoenix, Silver Phoenix, and all black breasted red, golden duckwing, silver duckwing, and red pyle varieties of various breeds. See variety descriptions, section V, also 144,

453 BROWN, e^b
INHERIT: Autosomal recessive; E, E^R, e^{Wh}, e^+, e^b, e^s, e^{bc}, e^y
LINKAGE: Unknown
CHARACT: The fifth allele at the E series plumage-pattern locus. Chicks are primarily all brown and darker on the back than the underside and lacking a well-defined dorsal head strip. Adult males have the "wild type," e^+/e^+, coloration (item 452). Adult females are stippled dark brown throughout and do not have a salmon-colored breast. Beak and feet are brown. This gene interacts with the columbian restriction gene, *Co*, (item 458) to produce the "classical" columbian restriction pattern and with the pattern gene, *Pg*, (item 461) to produce the penciling and partridge plumage patterns.
REF: Poultry Science 44:89-98, 1965.
SOURCE: Buff Brahma, Dark Brahma, Light Brahma, Dark Brown Leghorn, Light Sussex, Laced Wyandotte, and all "classical" columbian, partridge, and penciled varieties of various breeds. See variety descriptions, section V, also 24, 144,

454 SPECKLED HEAD (BLURRED HEAD), e^s
INHERIT: Autosomal recessive; E, E^R, e^{Wh}, e^+, e^b, e^s, e^{bc}, e^y
LINKAGE: Unknown
CHARACT: The sixth allele at the E series plumage-pattern locus. Chicks show confused speckled-blurred head pattern. Their back strips tend to be less precise than the "wild-type" chick (item 452) and the ground-color is dusky. Adult males have the "wild-type," e^+/e^+, coloration (item 452). Adult females are very coarsely stippled.
REF: Iowa State Journal of Science 40:41-64, 1965.
SOURCE: Unknown

455 BUTTERCUP, e^{bc}
INHERIT: Autosomal recessive; E, E^R, e^{Wh}, e^+, e^b, e^s, e^{bc}, e^y
LINKAGE: Unknown
CHARACT: The seventh allele at the E series plumage-pattern locus. Chicks are yellowish-white with narrow broken back stripes, spotty on the head with the eye-ear stripe being horizontally disrupted. Adult males are reddish-orange with black in the rectrices and remiges. Adult females have golden-buff ground-color with parallel rows of elongated black blotches marking each vane.
REF: Iowa State Journal of Science 40:51-64, 1965.
SOURCE: Buttercup, also 144,

456 RECESSIVE WHEATEN, e^y
INHERIT: Autosomal recessive; E, E^R, e^{Wh}, e^+, e^b, e^s, e^{bc}, e^y
LINKAGE: Unknown
CHARACT: The eighth allele at the E series plumage-pattern locus. Chicks are yellowish-white with yellow feet. Adult males are of the "wild-type" coloration (item 452). Adult females are cinnamon-buff with light stippling on the back, and the breast is a light salmon color.
REF: Iowa State Journal of Science 40:51-64, 1965.
SOURCE: Buff Minorca, Rhode Island Red, and Speckled Sussex.

457 MELANOTIC, *Ml*
INHERIT: Autosomal incomplete dominant
LINKAGE: Group III, see section IV
CHARACT: This mutant plumage color gene is responsible for the extension of black pigment into the normally red areas of pyle-zoned fowl. Its expression varies however with the E allele present. *Ml/Ml* males are nearly all black as are e^b/e^b, *Ml/Ml* females. e^+/e^+ *Ml/Ml* females are black with salmon breasts and e^{Wh}/e^{Wh}, *Ml/Ml* females are wheaten with dark brown backs and hackles. On an e^b/e^b, *Pg/Pg* background it causes double lacing, while on a e^b/e^b, *Co/Co*, *Pg/Pg* background it causes single lacing and on an *E/E*, *Db/Db*, *Pg/Pg* background it produces spangling. It has been shown to be the same gene as the one previously known as *Sp*, spangling. This gene has little effect on the chick down color.
REF: Journal of Heredity 62:215-219, 1971.
REF: British Poultry Science 27:431-433, 1986.
SOURCE: Black Minorca, White-Crested Black Polish, Laced Cochin, and Laced Wyandotte, also 144,

458 COLUMBIAN RESTRICTION, *Co*
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: This plumage mutant gene interacts with brown e^b/e^b (item 453) to produce the "classical" columbian restriction pattern, and with dominant wheaten, e^{Wh}/e^{Wh} (item 451) to produce the "black-tailed" columbian restriction pattern of the New Hampshire.
REF: Journal of Heredity 56:150-156, 1965.
REF: Journal of Heredity 61:280-283, 1970.
SOURCE: Buff Brahma, Light Brahma, Light Sussex, Laced Wyandotte, and all columbian and buff columbian varieties of various breeds. See variety descriptions, section V.

459 DARK BROWN COLUMBIAN-TYPE RESTRICTION, *Db*
INHERIT: Autosomal incomplete
LINKAGE: Group III, see section IV
CHARACT: A feather pigmentation inhibitor which inhibits red pigment deposition more completely than black pigment. Restricts black pigment somewhat similar to the *Co* gene (item 458). It also produces red-brown coloration as opposed to the characteristic orange-red of the *Co* gene. The effect of this gene is greater in males than females. In the presence of the pattern gene, *Pg*, (item 461) it causes the autosomal barring pattern.
REF: Journal of Heredity 58:130-134, 1967.
REF: Poultry Science 51:1149-1156, 1967.
REF: British Poultry Science 26:409-412, 1985.
SOURCE: Barred Fayoumi, Penciled Hamburg, Campine, also 144,

460 WHITE CREST
INHERIT: Autosomal incomplete dominant
LINKAGE: Unknown
CHARACT: This mutant has nonpigmented white crest feathers, but the rest of the bird's feathers are heavily pigmented being solid black or blue.
REF: Unpublished
SOURCE: White-Crested Black Polish and White-Crested Blue Polish

FEATHER-PATTERN MUTATIONS

461 PATTERN GENE, *Pg*
INHERIT: Autosomal incomplete dominant
LINKAGE: Group III, see section IV
CHARACT: A mutation which causes adult female feathers to have three or more distinct black pencilings conforming to the shape of each feather. Males have the so-called "wild-type" plumage pattern (item 452). In combination with other plumage color genes, the *Pg* gene results in the autosomal barring (item 462), double lacing (item 463) and the lacing (item 464) patterns. This gene previously was known as the penciling gene and has been shown to be the same as the genes which where previously known as *Ab*, autosomal barring and *Lg*, lacing.
REF: Poultry Science 39:233-234, 1960.
REF: British Poultry Science 26:409-412, 1985.
REF: British Poultry Science 27:431-433, 1986.
SOURCE: Dark Brahma, and partridge and penciled varieties in various breeds. See variety descriptions, section V, also all breeds listed under items 462, 463 and 464.

462 AUTOSOMAL BARRING, *Db, Pg*
INHERIT: Autosomal double dominant
CHARACT: This mutant color pattern completely inhibits melanin deposition in feathers on the head and neck. Melanin depostion is inhibited in all other feathers such that white or golden-bay bars are superimposed on what would otherwise be a black feather.
REF: Poultry Science 51:1149-1156, 1972.
REF: British Poultry Science 26:409-412, 1985.
SOURCE: Campine, Barred Fayoumi, and Penciled Hamburg

463 DOUBLE LACING, *Pg, Ml*
INHERIT: Autosomal double dominant
CHARACT: This mutant condition causes female feathers to be evenly laced with black, and the vane of the feather is subdivided by one crescentic penciling of black. The male plumage pattern is similar to that of the "wild-type" (item 452).
REF: British Poultry Science 27:93-96, 1986.
REF: British Poultry Science 28:173-175, 1987.
SOURCE: Double Laced Barnevelder and Dark Cornish

464 LACING, *Pg, Ml, Co*
INHERIT: Autosomal triple dominant
CHARACT: This mutant condition causes a black border on the white feathers of silver varieties and the brown-red or buff feathers of gold varieties. Neck feathers in both sexes are the reverse of this color arrangement. Varieties with a white border on feathers whose centers are buff or brown-red also carry this gene. This latter phenotype is due to the presence of dominant white, *I* (item 438).
REF: Journal of Heredity 63:179-184, 1972.
REF: British Poultry Science 27:93-96, 1986.
SOURCE: Laced Cochin, Laced Cornish, Laced Hamburg, Laced Polish, Sebright, and Laced Wyandotte.

465 MOTTLING, *mo*
INHERIT: Autosomal recessive; *mo*, mo^{pi}
LINKAGE: Unknown
CHARACT: This mutant gene eliminates melanin from the tips of a proportion of the black feathers in all parts of the body leaving these black feathers with a white tip. Chicks are black on the dorsal surface, but light yellow on the ventral surface and sides of the head. The gene's action produces a somewhat different phenotype on buff or red feathers. In these cases, the feathers are tipped with a white spangle and a narrrow crescentic black bar divides the white from the balance of the feather which is buff or some shade of brown-red. In these latter cases, it has no affect on chick down color.
REF: Poultry Science 59:1370-1374, 1980.
SOURCE: Ancona, Pyncheon, Speckled Sussex, Spangled Old English Game, and porcelain, mottled, and mille fleur varieties in various breeds. See variety descriptions, section V.

466 PIED, mo^{pi}
INHERIT: Autosomal recessive; *mo*, mo^{pi}
LINKAGE: Unknown
CHARACT: A trait in which the plumage is a mixture of black and white. Some feathers are all black while others are all white, still others are black with white tips of varying extent, or white with black spots.
REF: Journal of Genetics 18: 207-218, 1927.
REF: British Poultry Science 28: 733-734, 1987.
SOURCE: Exchequer Leghorn

467 SEX-LINKED BARRING, *B*
INHERIT: Sex-linked incomplete dominant
LINKAGE: Group V, see section IV
CHARACT: This gene interrupts deposition of pigment to yield a white bar in birds having melanin in some region of the plumage. The light and dark bars are of about equal width, extending across the width of the feather throughout the entire length of each feather. In chicks this gene produces a creamy-white patch on the back of an otherwise pigmented head.
REF: Journal of Experimental Zoology 95:361-397, 1944.
SOURCE: Delaware, Dominique, and barred, crele, and cuckoo varieties of various breeds. See variety descriptions, section V, also 157,

468 SPANGLING, *Db, Pg, Ml*
INHERIT: Autosomal triple dominant
CHARACT: A mutant trait in which feathers have a black V-shaped tip. Except for the spangle, the feathers are white in silver varieties, and buff or brown-red in golden varieties.
REF: Journal of Genetics 26; 385-394, 1932.
REF: British Poultry Science 1988 (in press).
SOURCE: Spangle Hamburg, Silver Appenzeller Spitzhauben, and Silver Thuringer Barthuhner

JAPANESE QUAIL

(Coturnix coturnix japonica)

EGG-SHELL-COLOR MUTATION

469 WHITE EGG SHELL
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: This mutant gene causes the inner and outer surface of Japanese quail eggs to be chalk-white. Normally the outer surface is pale greenish-brown to gray-brown and overlaid by red-brown to greenish- brown superficial pigment applied as speckles and blotches. The normal inner surface is pale green.
REF: Journal of Heredity 55:136-138, 1964.
SOURCE: 10, 20, 34, 47, 114, 256,

IMMUNOLOGICAL MUTATIONS

470 Ht AGGLUTINOGEN, *Ht*
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: This gene allows the extracts of rhizomes of *Helianthus tuberosus* to agglutinate the red blood cells of young and adult quail.
REF: Unpublished
SOURCE: 34,

471 Ns AGGLUTINOGEN, *Ns*
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: This gene allows the extracts of the fruit bodies of *Naematoloma sublateritium* to agglutinate the red blood cells of sexually mature females.
REF: Animal Blood Group Research Information, 9: 43-45, 1981.
SOURCE: 34,

472 Pn AGGLUTINOGEN, *Pn*
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: This gene allows the extracts of the seeds of *Arachys hypogaea* to agglutinate the red blood cells of young and adult quail.
REF: Japanese Journal of Zootechnical Science 48: 463-467, 1977.
SOURCE: 34,

473 Ps AGGLUTINOGEN, *Ps*
INHERIT: Unknown
LINKAGE: Unknown
CHARACT: This gene allows the extracts of the seeds of *Pisum sativum* to agglutinate the red blood cells of young and adult quail.
REF: Unpublished
SOURCE: 34,

474 Sb AGGLUTINOGEN, *Sn*
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: This gene allows the extracts of the seeds of *Glycine max* to agglutinate the red blood cells of sexually immature birds of either sex and of males of any age carrying the *Sn* gene. But red blood cells of sexually mature females carrying the *Sn* gene are not agglutinated.
REF: Japanese Journal of Zootechnical Science 48:227-234, 1977.
SOURCE: 34,

BIOCHEMICAL MUTATIONS

475 PANCREATIC AMYLASE, $Amy\text{-}2^A$
INHERIT: Autosomal codominant; $Amy\text{-}2^A$, $Amy\text{-}2^B$
LINKAGE: Unknown
CHARACT: This pancreatic amylase isozyme mutant has a slower migrating electrophoretic mobility than its codominant allele (item 476).
REF: Japanese Journal of Genetics 53:55-57, 1978.
SOURCE: 35,

476 PANCREATIC AMYLASE, $Amy\text{-}2^B$
INHERIT: Autosomal codominant; $Amy\text{-}2^A$, $Amy\text{-}2^B$
LINKAGE: Unknown
CHARACT: This pancreatic amylase isozyme mutant has a faster migrating electrophoretic mobility than its codominant allele (item 475).
REF: Japanese Journal of Genetics 53:55-57, 1978.
SOURCE: 35,

477 GLYCOGENOSIS TYPE II
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: Affected quail have difficulty in raising their wings. Excessive glycogen accumulates in the liver, heart, skeletal muscle, and brain due apparently to reduced acid maltase activity. Bird's growth is normal and the condition does not result in death.
REF: Laboratory Animals 17:138-142, 1983.
SOURCE: 34,

PLUMAGE-COLOR MUTATIONS

478 EXTENDED BROWN, *E*
INHERIT: Autosomal incomplete dominant; E, e^+, e^{eb}
LINKAGE: Unknown
CHARACT: This mutant color gene extends the distribution of black and dark brown pigment throughout the plumage. Both sexes appear the same.
REF: Journal of Heredity 70:205-210, 1979.
SOURCE: British Range, English White, and Tuxedo, also 7, 19,

479 RED-HEAD, e^{rh}
INHERIT: Autosomal recessive; E, e^{+}, e^{rh}
LINKAGE: Unknown
CHARACT: The underfluff of both sexes is smoky black. The base of the feathers are white with irregular bands of black and rust. Feathers are usually tipped in rust. The beak and shanks tend to be whitish color and eye color is unaffected. Females are generally lighter in color with the dorsal being darker. Breast is whitish with upper breast feathers tipped with black and rust. Flanks and abdomen are white. Head is white with black cap whose feathers are tipped with rust. Males are much darker overall. There is considerably more black in all feathers with darker rust tips while the breast tends to be light rust. The head is bright rust with a black cap or head streak.
REF: Journal of Heredity 70:413-415, 1979.
SOURCE: 7,

480 RECESSIVE WHITE, *wh*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: This mutant color gene produces a white bird with dark eyes when homozygous and a two-color pattern known as "tuxedo" when heterozygous. The "tuxedo" pattern is white on the ventral surface including the neck and face while the dorsal surface is an intermingling of black and brown pigment.
REF: Journal of Heredity 70:205-210, 1979.
SOURCE: English White, and Tuxedo, also, 7, 256, 257,

481 YELLOW, *Y*
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: This mutant color gene results in the appearance of a rich, golden-wheat-straw colored bird. The general pigment distribution is the same as in the "wild-type" Japanese quail (item 1128) except that the wheat-straw colored shafting of the black and hackle feathers is much wider and the wing bow and head feathers are also wheat-straw yellow colored. Homozygotes Y/Y are lethal.
REF: Japanese Journal of Zootechnical Science 38:163-166, 1967.
SOURCE: Manchurian Golden, also 7, 34, 35,

482 IMPERFECT ALBINISM, *al*
INHERIT: Sex-linked recessive; Al^{+}, al^{D} al^{c}, al
LINKAGE: Sex chromosome; al 35 br
CHARACT: This pigmentation mutant results in subnormal levels of pigmentation of the eyes and feathers of affected birds. Faint stripes on the backs of the adults is apparently due to structural color only. Viability is reduced both before and after hatching in birds homozygous for this gene.
SOURCE: 7, 10, 25, 34,

483 DILUTE, al^{D}
INHERIT: Sex-linked recessive; Al^{+}, al^{D}, al^{c}, al
LINKAGE: Sex chromosome; al^{D} 35 br
CHARACT: This mutant pigmentation gene causes an overall reduction in pigmentation. The shanks are free of pigment, down is light in color as is the adult plumage. Eye color is not affected. It is also one of the alleles at the Al^{+} locus.
REF: Poultry Science 58:1-9, 1979.
SOURCE: 7, 34,

484 SEX-LINKED CINNAMON, al^{c}
INHERIT: Sex-linked recessive; Al^{+}, al^{D} al^{c}, al
LINKAGE: Sex chromosome ; al^{c} 35 br
CHARACT: This mutant produces a diluted brown plumage and red eyes.
REF: Experimental Animals 22:151-159, 1973.
SOURCE: 34, 35,

485 SEX-LINKED BROWN, *br*
INHERIT: Sex-linked recessive
LINKAGE: Sex chromosome; br 35 al
CHARACT: A feather color mutant. A more complete description was not available.
REF: Experimental Animals 22:151-159, 1973.
SOURCE: 35,

486 PANDA, *s*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: This is a spotted plumage color mutant. Chicks are primarily light yellow and adults are primarily white, however wild-type down or feathers are sprinkled around the eyes and ears, and are on the head and back, and in the tail secondary flight and covert feathers.
REF: Experimental Animals 23:59-61, 1974.
SOURCE: 34, 35,

487 BLACK-AT-HATCH, *Bh*
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: A plumage color mutant in which the yellow stripes on the head and back of newly hatched heterozygous chicks are faint or missing. In adults the difference in the plumage color between wild- and Bh types is less conspicuous. In homozygotes the trait is an embryonic lethal. Embryos die at 4-6 days of incubation showing whole body hemorrhage, degeneration of liver tissue, less well-developed eyes and occasionally less well-developed limbs and tails.
REF: Japanese Journal of Genetics 52:183-195, 1977.
SOURCE: 35,

488 WHITE, *W*
INHERIT: Autosomal incomplete dominant
LINKAGE: Unknown
CHARACT: Homozygotes for this plumage color mutant have white plumage whereas heterozygotes for the gene show a diluted plumage color. Birds homozygotes for this gene have low viability.
REF: Experimental Animals 22:151-159, 1973.
SOURCE: 35,

489 BLACK, *D*
INHERIT: Autosomal incomplete dominant
LINKAGE: Unknown
CHARACT: A feather color mutant. A more complete description was not available. This may be the same as item 478.
REF: Japanese Poultry Science 15:236-241, 1978.
SOURCE: 25, 35,

490 SILVER, *B*
INHERIT: Autosomal incomplete dominant
LINKAGE: Unknown
CHARACT: Homozygotes show white plumage color and a retinal defect (ring retina: central part of the retina lacks pigment). Heterozygotes show greyish plumage color except several white feathers at the wing tip.
REF: Japanese Journal of Zootechnical Science 40:129-130, 1969.
SOURCE: 35,

491 AUTOSOMAL DILUTE
INHERIT: Unknown
LINKAGE: Unknown
CHARACT: A feather color dilution mutant which is semilethal when homozygous. A more complete description was not available.
REF: Unpublished
SOURCE: 34,

492 CINNAMON, *cin*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A dilution gene which reduces the dark brown pigment of the *E/E* quail to a bright orange-brown color in chicks and a cinnamon color in adults. Chick eyes are red while adults', although darker, still have a faint red tinge.
REF: Canadian Journal of Genetics and Cytology 24:163-166, 1982.
SOURCE: 7,

493 FAWN
INHERIT: Unknown
LINKAGE: Unknown
CHARACT: A feather color dilution mutant which produces a light buff/ fawn coloration with some spots of darker color. The head of the male is a darker rust color.
REF: Unpublished
SOURCE: 257,

494 BLEU
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A color mutant which confers a blue color to the feathers. A more complete description is not available.
REF: Unpublished
SOURCE: 25,

495 ROUX
INHERIT: Sex-linked
LINKAGE: Sex chromosome; *al* 30 *roux*
CHARACT: A feather color mutant. A more complete description was not available.
REF: Unpublished
SOURCE: 25,

496 WHITE-BREASTED, *wb*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: The dorsal plumage is similar to the wild-type pattern. White feathers cover the face to just above the eyes, the underside of the neck, the entire breast, and the sternum up to and including the vent area. The primary feathers down to most of the secondary feathers as well as their coverts are also white.
REF: Canadian Journal of Genetics and Cytology 20:1-8, 1978.
SOURCE: 7,

497 WHITE CRESCENT, *cr*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A cresent-shaped band of white feathers extended across the breast of the brown-feathered birds (item 478). This band is located at the junction of ventral cervical and the pectoral tracts.
REF: Canadian Journal of Genetics and Cytology 20:1-8, 1978.
SOURCE: 7,

498 WHITE PRIMARIES, *wp*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: Primary feathers are white on an otherwise colored bird.
REF: Unpublished
SOURCE: 7,

499 WHITE BIB, *bi*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A feather color mutant. A more complete description was not available.
REF: Unpublished
SOURCE: 7,

FEATHER-STRUCTURE MUTATIONS

500 PORCUPINE FEATHERS, *pc*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A feather structure mutant resulting from the failure of the barbs to uncoil. The condition is particularly noticable on the wings and back. Birds with this condition have poor egg production, lower fertility, and higher embryonic and chick mortality.
REF: Poultry Science 61:429-433, 1982.
SOURCE: 7,

501 ROUGH-TEXTURED, *rt*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A feather structure mutant in which the down appears matted and wet-looking and has the handling sensation of an extremely rough texture. As adults the proximal and distal barbules are severely affected and are directed towards the feather shaft, which is opposite to the normal condition. There is also reduced embryo viability from *rt/rt* female parents.
REF: Canadian Journal of Genetics and Cytology 21:443-448, 1979.
SOURCE: 7,

502 SHORT BARBS, *ab*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A feather structure mutant in which the feather barbs are greatly shortened. Approximately three-quarters of the length of the barbs are missing from both sides of the back contour feathers. Breast and flight feathers are similarly affected but to a lesser degree. This trait is not associated with poor reproduction.
REF: Poultry Science 61:2319-2321, 1982.
SOURCE: 7,

503 DEFECTIVE FEATHERS, *Df, mdf*
INHERIT: Autosomal dominant and recessive, variable expressivity
LINKAGE: Unknown
CHARACT: The combined action of two loci produce this feather structure mutant. The down feathers are short and sparse at hatching, while abnormal barbule structure is evident in the later plumage. Females are more severely affected than males. The trait is controlled by a dominant gene, *Df*, whose manifestation is permitted by a recessive epistatic gene, *mdf*, at a second locus. The dominant gene is lethal when homozygous.
REF: Journal of Hereditary 74:184-188, 1983.
SOURCE: 7,

SKELETAL MUTATION

504 LONG BEAK, *lb*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A skeletal mutant affecting the beak. A more complete description was not available.
REF: Unpublished
SOURCE: 7,

TURKEY

(Meleagris gallopavo)

NEUROLOGICAL MUTATION

505 BOBBER, *bo*
INHERIT: Sex-linked recessive
LINKAGE: Sex chromosome
CHARACT: A cervical ataxia mutant in turkeys which causes a cervical bending of the neck followed by pendulum motion of the head between the thighs. Seizures are induced by sight or sound stimuli and appear between two and four weeks of age. The bobbing condition continues for several minutes after the stimulus has been removed. Growth, livability and reproduction are not greatly affected, although the condition remains throughout the bird's life.
REF: Poultry Science 51:1815, 1972.
SOURCE: 215,

PHYSIOLOGICAL MUTATIONS

506 BINUCLEATED RED BLOOD CELL, *bn*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: This gene expresses itself one to two days after hatching with the appearance of binucleated red blood cells and other abnormal red blood cells in bone marrow. Abnormal red blood cells appear in the peripheral blood about one day later. In adults, about 40% of red blood cells are abnormal although in some individuals it may be as high as 60%. This mutant gene affects the mitotic spindle and produces an anemia.
REF: Genetics 65:51-63, 1970.
SOURCE: 189,

507 DEGENERATIVE MYOPATHY
INHERIT: Multifactorial
LINKAGE: Unknown
CHARACT: This condition appears to affect only the supracoracoideus muscles of generally mature turkeys. It is characterized by intimal hyperplasia, necrosis, walling-off of the damaged area, atrophy, and replacement of fibers with connective tissue. Muscle damage appears to be due to impairment of the vascular supply.
REF: Journal of Heredity 66:362-366, 1975.
SOURCE: 215,

508 MUSCULAR DYSTROPHY, *dy*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: A muscle mutation which causes muscle atrophy in the pectoral and alar regions while the red muscles of the leg appear unaffected. Hypertrophy of muscles does not occur prior to atrophy. Time of onset of the atrophic changes is between 8 and 16 weeks of age. This condition reduces pectoral muscle weight by approximately 40 to 65%.
REF: Journal of Heredity 58:189-193, 1967.
SOURCE: 215,

509 HEREDITARY GLAUCOMA, *ga*
INHERIT: Autosomal recessive, incomplete penetrance.
LINKAGE: *ga — D*
CHARACT: Protrusion and increased curvature of the cornea appears prior to 22 weeks of age. Intraocular pressure increases during early stages, then drops below normal levels as disease progresses. In homozygous matings, the incidence is 40.5% for males and 87.1% for females.
REF: Poultry Science 61:1548, 1982.
SOURCE: 144,

EMBRYONIC LETHAL MUTATIONS

510 CHONDRODYSTROPHY, *ch*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: This mutant trait results in embryonic death during the later part of incubation. Embryos are characterized by shortened beaks and shanks and have a broad head.
REF: Journal of Heredity 66:399-343, 1975.
SOURCE: No longer avaliable.

511 RING LETHAL, *rl*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: An early embryonic disorder affecting the blastoderm. At 48 hour of incubation this lethal condition is characterized by a blastodermal ring approximately 1.6 mm dense and about 12 mm in diameter with or without cellular development in the area pellucida.
REF: Journal of Heredity 76:474-476,1985.
SOURCE: 215,

512 SWOLLEN DOWN PLUMULES, *sdp*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: An embryonic lethal condition characterized by an enlargement of the dermal pulp cavity of down feathers . The lethality of the condition is expressed between 20 days of incubation and the time of pipping. Phenotypic variation of the disorder is expressed in the number of pterylae that contain the abnormal down plumules.
REF: Poultry Science 65:823-828, 1985.
SOURCE: 215,

513 KNOBBY DOWN, *kn*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: This gene causes a defect in the down plumules such that an accumulation of nondifferentiated feather material forms a knob at the tip of the distal end of each individual barb. Adult feathers show less effect, but are rough in appearance. About 60% of knobby embryos die during the last 4 or 5 days of incubation.
REF: Journal of Heredity 61:119-122, 1970.
SOURCE: 215,

514 BLACK, *B*
INHERIT: Autosomal dominant; B, b^+ b^l
LINKAGE: Unknown
CHARACT: This gene is the most dominant in the triple-allelic b^+ series. The entire plumage is black with a bright metallic sheen. In the presence of other genes such as *r* (item 518) or *D* (item 522) it acts as a diluter.
REF: Genetics 30:305-322, 1945.
SOURCE: Black, Jersey Buff, and Dominant or Blue Slate.

515 BRONZE, b^+
INHERIT: Autosomal recessive; B, b^+, b^l
LINKAGE: Unknown
CHARACT: This gene is one of a triple-allelic b^+ series, and is the allele which produces the so-called "wild-type". Contour feathers of the female are black with a wide bronze band near the end, followed by a narrow distinct black band and finally terminating in a white edging, the width of which increases on each feather toward the posterior part of the body. Male feathers are similar but lack the white tips. The main tail and covert feathers are marked with alternating black and brown bars, terminating in a white band. Flight feathers are marked with alternating black and white bars.
REF: Genetics 30:305-322, 1945.
SOURCE: Bronze, Bourbon Red, Narragansett, Gray, Slate, Lilac Buff, Silver Auburn, Royal Palm, Nebraskan Spotted or Nebraska Royales, Light and Dark Brown, and Wild Turkey.

516 BLACK-WINGED BRONZE, b^l
INHERIT: Autosomal recessive; B, b^+, b^l
LINKAGE: Unknown
CHARACT: This gene is the most recessive in the triple-allelic b^+ series. It produces a bronze plumage pattern (item 515) but with black primary flight feathers and black secondary flight feathers with white tips. There are also white markings in the region of the shoulder.
REF: Genetics 30:305-322, 1945.
SOURCE: Black-Winged Bronze, or Crimson Dawn, and Penna Palm

517 NARRAGANSETT, *n*
INHERIT: Sex-linked recessive
LINKAGE: Sex Chromosome, *n* 30.9 *e*
CHARACT: This pigmentation gene greatly reduces the intensity of red pigment. Thus it gives a silvery effect to standard bronze pattern (item 515) by causing a graying effect in the subterminal bronze bands.
REF: Journal of Heredity 34:246-256, 1943.
SOURCE: Narragansett, Silver Auburn or Light Brown, Royal Palm, and Nebraskan Spotted or Nebraska Royale, also 20,

518 RED, *r*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: This plumage color gene almost completely eliminates black from the feathers. Body feathers are a rich dark chestnut mahogany. In males each feather has a very narrow edging of black, while in females the black is absent but the breast feathers have a narrow threadlike edging of white. Tail and flight feathers are white. In combination with the black gene, *B* (item 514), it produces a buff color.
REF: Genetics 30:305-322, 1945.
SOURCE: Bourbon Red, Jersey Buff, and Lilac Buff

519 WHITE, *c*
INHERIT: Autosomal recessive; C^+, c^g, c
LINKAGE: Unknown
CHARACT: This gene is completely epistatic to all other color genes and recessive to its dominant color producing allele, C^+. All pigmentation is inhibited and feathers are pure white.
REF: Genetics 30:246-256, 1945.
SOURCE: Most all white turkeys

520 GRAY, c^g
INHERIT: Autosomal recessive; C^+, c^g, c
LINKAGE: Unknown
CHARACT: An allele at the C^+ locus and incompletely dominant to the *c* allele. This gene reduces pigment intensity such that plumage color is intermediate between full color and white.
REF: Unpublished
SOURCE: Palm

521 BROWN, *e*
INHERIT: Sex-linked recessive
LINKAGE: Sex chromosome; *e* 30.9 *n*
CHARACT: This gene action is that of diluting the feather pigment intensity. The distribution of the brown pigment in the plumage is the same as in the bronze pattern (item 515) but the typical bronze type is faded to a reddish-brown color. In combination with the narragansett gene, *n*, (item 517) the brown color is a lighter shade.
REF: Journal of Heredity 41:205-207, 1950.
SOURCE: Light Brown, Dark Brown, and Silver Auburn, also 20,

522 DOMINANT SLATE OR BLUE SLATE, *D*
INHERIT: Autosomal dominant
LINKAGE: Unknown
CHARACT: This dominant gene reduces the black pigment of any plumage pattern to a slaty blue but has little effect on red pigment.
REF: Journal of Heredity 34:246-256, 1943
SOURCE: Dominant or Blue Slate

523 SLATE, *sl*
INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: This mutant gene produces a slate plumage color that is a lighter shade than that produced by dominant slate gene, *D* (item 522). Two distinct phenotypes are produced in combination with the two alleles at the R^+ locus. In combination with the R^+ allele, the shade of slate is darker than when combined with *r* (item 518) and the flight feathers are barred and the tail feathers are penciled. With the *r* allele the wing flights are unbarred and nearly white while the tail is slaty red with some white in the middle. This latter color type is sometimes referred to as lilac or buff.
REF: Journal of Heredity 31:215-217, 1940.
SOURCE: Slate or Lilac Buff

524 PALM, *p*
INHERIT: Autosomal
LINKAGE: Unknown
CHARACT: The palm gene inhibits the production of brownish-red pigment and restricts black pigmentation such that the feathers are white, edged with black on the breast and back and with a black bar on the tail.
REF: Genetics 30;305-322, 1945
SOURCE: Royal Palm

525 SPOTTING, *sp*

INHERIT: Autosomal recessive
LINKAGE: Unknown
CHARACT: The action of this gene is to suppress the depostion of brown pigment in the plumage. Chicks are white with a brown head spot. The first plumage is white. Subsequent plumages are white with black pigment scattered throughout it. No feathers are completely black and no brown pigment is visible.
REF: Journal of Heredity 46:285-288, 1955.
SOURCE: Nebraskan Spotted or Nebraska Royales

526 SNOW WHITE DOWN

INHERIT: Multifactorial
LINKAGE: Unknown
CHARACT: The down color of this medium size white turkey line is a pure white "snow white" color at hatching. There is no sign of any buff coloration.
REF: Genetics 30:305-322, 1945.
SOURCE: 215,

"Good terminology is a key to clear and easy communication. This is particularly evident in science, where every speciality has its own highly technical and often extensive vocabulary of words and symbols."

George D. Snell

III. LISTING OF CHICKEN, JAPANESE QUAIL AND TURKEY TRAITS AND GENE SYMBOLS

CHICKEN

(Gallus domesticus)

GENE[1, 2]	*TRAIT NAME*
BIOCHEMICAL MUTATIONS	
Acon	Aconitase-cytoplasmic
Acp, acp^{O}	Acid phosphatase-liver
Acp-2$^{A, B}$	Acid phosphatase-2-leucocyte
Ada$^{A, B}$	Adenosine deaminase
Ade-A	Adenine synthesis A
Ade-B	Adenine synthesis B
Akp$^{1, 2, 3, 4}$	Alkaline phosphatase-plasma
Akp-2^{0}, *akp-2*^{a}	Alkaline phosphatase-2-plasma
Alb$^{C, C', F, S}$	Albumin serum
Ald	Alcohol dehydrogenase-liver
Amy-1$^{A - C}$	Amylase-1-serum
Amy-2$^{A - C}$	Amylase-2-pancreas
Ca-1$^{A - C}$ **	Carbonic anhydrase-red cell
Cer$^{A, B}$ **	Ceruloplasmin
Cml	Calmodulin
Ct$^{A, B}$	Catalase activity-red cell
Es-1$^{A1, A2, B, C, D}$	Esterase-1-serum
Es-2$^{A, B}$ **	Esterase-2-plasma
Es-3$^{A, B, 0}$	Esterase-3-liver
Es-4$^{A, B, 0}$	Esterase-4-liver
Es-5$^{A, B}$	Esterase-5-liver
Es-6$^{A, B}$	Esterase-6-liver
Es-7$^{A, O}$	Esterase-7-liver
Es-8$^{A, B}$	Esterase-8-erythrocyte
Es-9$^{A, O}$	Esterase-9-liver
Es-10$^{A, B}$	Esterase-10-cardiac muscle
Es-11$^{A, B}$	Esterase-11
$G_1^{F, S}$	Lysozyme G_1-egg white
$G_2^{A, B, L, L'}$	Ovoglobulin G_2-egg white
$G_3^{A, A^F, B, I, M}$	Ovoglobulin G_3-egg white
$G_4^{A, B}$	Ovoglubulin G_4-egg white
Gc	Vitamin D binding protein
Gdr	Glucose-6-phosphate dehydrogenase
Glo$^{1, 2}$	Glyoxalase-1
Hp$^{S, F}$	Haptoglobin
Hprt	Hypoxanthine phosphoribosyl transferase
Lap$^{A, B}$ **	Leucine aminopeptidase-serum
Mpi-1$^{A, B, C}$	Mannosephosphate isomerase
Oc$^{b, g}$	Ornithine transcarbamylase-kidney
Ov$^{A, B}$	Ovalbumin-egg white
Pa$^{A, B}$	Prealbumin-egg white
Pa-2$^{A, B}$	Prealbumin-2
Pa-3$^{A, B}$	Prealbumin-3
Pas-A, pas-A	Postalbumin A-plasma
Pgd^{ch}	Phosphogluconate dehydrogenase-red cell
Pgk$^{F, S}$	Phosphoglycerate kinase
Pgm$^{A, B}$	Phosphoglucomutase-cardiac muscle
Tf$^{A, B, BW, C}$	Transferrin-conalbumin
(tk-F)	Cytosol thymidine kinase F
IMMUNOLOGICAL MUTATIONS	
Aa	Allo-aggression
At, at^{+}	*Allium tuberosum* agglutinogen
B-F	MHC-cell antigen B-F
B-G (Ea-B$^{1 - 30}$*)*	MHC-erythrocyte specific antigen B-G
B-L	MHC-leukocyte specific antigen B-L
Bu$^{1 - 3}$	B-cell alloantigen
C-4	Complement 4
E-1	Euglobulin
Ea-A$^{1 - 7}$	Erythrocyte alloantigen A
Ea-C$^{1 - 8}$	Erythrocyte alloantigen C
Ea-D$^{1 - 5}$	Erythrocyte alloantigen D
Ea-E$^{1 - 11}$	Erythrocyte alloantigen E

Ea-H$^{1-3}$	Erythrocyte alloantigen H
Ea-I$^{1-8}$	Erythrocyte alloantigen I
Ea-J$^{1-2}$	Erythrocyte alloantigen J
Ea-K$^{1-4}$	Erythrocyte alloantigen K
Ea-L$^{1-2}$	Erythrocyte alloantigen L
Ea-N$^{1-2}$	Erythrocyte alloantigen N
Ea-P$^{1-10}$	Erythrocyte alloantigen P
Ea-R$^{1-2}$	Erythrocyte alloantigen R
Gs-1, gs-1^{+**}	Soybean agglutinogen
H-W	W-chromosome antigen
H-Z	Z-chromosome antigen
Hi, hi^{+}	*Lathyrus cicera* agglutinogen
IgG-1^{a-n}	7S-1 Ig heavy chain
IgG-2	7S-2 Ig heavy chain
IgL-1^{a-b}	Ig light chain
IgM-1^{a-d}	17S-1 IgM heavy chain
Ir-GAT^{1,19}	Immune response-GAT
Ln-1, ln-1^{+**}	*Lepista nuda* agglutinogen
Ly-4^{a,b}	Lymphocyte antigen
Mp$_1$, *mp*$_1$$^{+}$	*Maculura pomifera* agglutinogen 1
Mp$_2$, *mp*$_2$$^{+}$	*Maculura pomifera* agglutinogen 2
Mr-1^{hi}, *mr-1*^{lo}	Mitogen response 1
Ph, ph^{+}	Garden pea agglutinogen
Pn-1, pn-1^{+**}	Peanut agglutinogen
Pp, pp^{+}	"Pp" agglutinogen
Pw$_1$, *pw*$_1$$^{+}$	Pokeweed agglutinogen 1
Pw$_2$, *pw*$_2$$^{+}$	Pokeweed agglutinogen 2
Si, si^{+}	Sesame agglutinogen
Ssb, ssb^{+}	Soybean agglutinogen
St$_1$, *st*$_1$$^{+}$	Potato agglutinogen 1
St$_2$, *st*$_2$$^{+}$	Potato agglutinogen 2
Tg$_1$, *tg*$_1$$^{+}$	Tulip agglutinogen 1
Tg$_2$, *tg*$_2$$^{+}$	Tulip agglutinogen 2
Th-1^{several}	T-cell alloantigen
(Tu, tu^{+} *)*	Tuberculin hypersensitivity
Va, va^{+}	*Viscum album* agglutinogen
Vg	Vitellogenin
(MF)	ConA mitogenesis
(MF)	PHA mitogenesis
(MF)	7S Ig deficiency

ONCOGENE MUTATIONS

c-erb A	For avian erythroblastosis virus A
c-erb B	For avian erythroblastosis virus B
c-ets	For E26 leukemia virus
c-fps	For Fujinami and PRC II sarcoma virus
c-lil	A DNA sequence
c-mil/mht	For Mill Hill 2 virus
c-myb	For avian myeloblastosis virus
c-myc	For avian myelocytomatosis virus
c-rel	For avian reticuloendotheliosis virus
c-ros	For avian sarcoma virus UR2
c-src	For Rous sarcoma virus
c-yes	For avian sarcoma virus Y73

ENDOGENOUS AVIAN TUMOR VIRUS MUTATIONS

ev-1	Defective ALV provirus, gs^{-} chf^{-} V^{-}
ev-2	ALV provirus, codes for RAV-0
ev-3	Defective ALV provirus, gs^{+} chf^{+} V
ev-4	Defective ALV provirus, unexpressed
ev-5	Defective ALV provirus, unexpressed
ev-6	Defective ALV provirus, gs^{-} chf^{+} V^{-}
ev-7	Defective ALV provirus, codes for 15_B-ALV
ev-8	Defective ALV provirus, unexpressed
ev-9	Defective ALV provirus, gs^{-} chf^{+} V^{-}
ev-10	ALV provirus, codes for ev-10-ILV
ev-11	ALV provirus, codes for ev-11-ILV
ev-12	ALV provirus, codes for ev-12-ILV
ev-13	Endogenous retrovirus
ev-14	Endogenous retrovirus
ev-15	Endogenous retrovirus
ev-16	Endogenous retrovirus
ev-17	Endogenous retrovirus
ev-18	Endogenous retrovirus
ev-19	Endogenous retrovirus
ev-20	Endogenous retrovirus
ev-21	Endogenous retrovirus
ev-22	Endogenous retrovirus
ev-23	Endogenous retrovirus
ev-24	Endogenous retrovirus
ev-25	Endogenous retrovirus
ev-26	Endogenous retrovirus
Gr-E, gr-E	Growth of subgroup E ALV
R-Rs-1, r-Rs-1	Rous sarcoma regression
Tv-A^{s}, *tv-A*^{r}	Subgroup A ALV receptor
Tv-B$^{s1, s2, s3}$, *tv-B*^{r}	Subgroup B ALV receptor
Tv-C^{s}, *tv-C*^{r}	Subgroup C ALV receptor
Tv-E^{s}, *tv-E*^{r}	Subgroup E ALV receptor

METABOLIC MUTATIONS

Am^{+}, *am*	Muscular dystrophy
(*Aro, aro*$^{+}$)	Atresia of reproductive organs
Bc^{+}, *bc*	Blind cataracts
Beg^{+}, *beg*	Blindness, enlarged globe
(*Bf*$^{+}$, *bf*)	Short down-blistered foot lethal
(*Bli*$^{+}$, *bli*)	Blindness
(*Cla*$^{+}$, *cla*)	Congenital leg anomaly
(*Coc*$^{+}$, *coc*)	Congenital crippling
(*Cop*$^{+}$, *cop*)	Congenital perosis
(*Dac*$^{+}$, *dac*)	Dactylolysis
(*Dehy*$^{+}$, *dehy*)	Ichthyosis-dehydrated
(*Di*$^{+}$, *di*)	Diabetes insipidus
(*Eta, eta*$^{+}$)	Egg taints
Ga^{+}, *ga*	Gasper
(*Ggc*$^{F, S}$)	Gamma globin chain
(*Go*$^{+}$, *go*)	Gout, diet induced
(*Hb*$^{J, II}$)	Hemoglobin type I & II
(*Hgh, hgh*$^{+}$)	Hereditary gonad hyperplasia
(*Int*$^{+}$, *int*)	Triploid intersex
Kh^{+}, *kh*	Kidney hypoplasia
Lcb$^{1, 2, 0}$	Low density lipoprotein
Lc1/3f$^{I, II, III}$	Myosin light chain-1
Lp-1$^{a, b}$ **	Serum lipoprotein
(*Mi-2, mi-2*$^{+}$)	Dominant microphthalmia
Mi-3^{+}, *mi-3***	Microphthalmia-3
Pe^{+}, *pe*	Perosis
Pop^{+}, *pop*	Pop-eye
Rc^{+}, *rc*	Rod and cones blindness
Rd^{+}, *rd*	Riboflavinuria
Rdd^{+}, *rdd*	Retinal dysplasia & degeneration
Ro^{+}, *ro*	Restricted ovulator
Rov, rov^{+} **	Right oviduct
(*Sd*$^{+}$, *sd*)	Scleroderma
(*Tsh, tsh*$^{+}$)	Thyrotropin sensitivity
(*MF*)	Abnormal tibial-metatarsal joints
(*MF*)	Coloboma of the iris
(*MF*)	Cornish muscular dystrophy
(*MF*)	Crippling anomaly
(*MF*)	Double oviduct
(*MF*)	Exencephaly
(*MF*)	Hereditary autoimmune thyroiditis
(*MF*)	Hereditary uricemia and articular gout
(*MF*)	Edema
(*MF*)	Inherited anemia
(*UNK*)	Autoimmune thyroiditis DAM
(*UNK*)	Extended crowing
(*UNK*)	Retinal dystrophy DAM

NEUROLOGICAL MUTATIONS

(*Cd*$^{+}$, *cd*)	Cerebellar degeneration
(*Ce*$^{+}$, *ce*)	Cerebellar hypoplasia
Cq^{+}, *cq*	Congenital quiver
Cy^{+}, *cy*	Crazy
Epi^{+}, *epi*	Epileptiform seizures
Fs^{+}, *fs*	Faded shaker
(*Hnd, hnd*$^{+}$)	Hereditary nervous disorder
j^{+}, *j*	Jittery
Lo^{+}, *lo*	Congenital loco
Pir^{+}, *pir*	Pirouette
Px^{+}, *px*	Paroxysm
Sh^{+}, *sh*	Shaker
Sh-2^{+}, *sh-2*	Shaker-2
(*Sln*$^{+}$, *sln*)	Sex-linked nervous disorder
Tip^{+}, *tip*	Tipsy
Xl^{+}, *xl*	Sex-linked lethal
(*MF*)	Arched neck
(*MF*)	Ataxia
(*MF*)	Congenital tremor
(*UNK*)	Bowing

EMBRYONIC LETHAL MUTATIONS

Blr^{+}, *blr*	Blood-ring lethal
Ch^{+}, *ch*	Chondrodystrophy
Chz^{+}, *chz*	Sex-linked chondrodystrophy
Cl, cl^{+}	Cornish lethal
Cm^{+}, *cm***	Coloboma
Cn^{+}, *cn*	Crooked-neck dwarf
Dck^{+}, *dck*	Duck beak
Dd-2^{+}, *dd-2*	Donald duck
Dd-3^{+}, *dd-3*	Donald duck-3
(*Dl*$^{+}$, *dl*)	Dorking lethal
Dp-1^{+}, *dp-1*	Diplopodia-1
Dp-2^{+}, *dp-2*	Diplopodia-2
Dp-3^{+}, *dp-3*	Diplopodia-3
Dp-4^{+}, *dp-4*	Diplopodia-4
Dp-5^{+}, *dp-5*	Diplopodia-5
Ec^{+}, *ec*	Ectrodactyly
Eu^{+}, *eu*	Eudiplopodia
L^{+}, *l*	Recessive white lethal
Lk^{+}, *lk*	Ladykiller
Ll^{+}, *ll*	Limbless-amelia

Ln^{+}, *ln*	Sex-linked lethal liver necrosis
Md^{+}, *md*	Missing mandible
Mi^{+}, *mi*	Bilateral microphthalmia
Mm-A^{+}, *mm-A***	Micromelia-Abbott
Mm-H^{+}, *mm-H***	Micromelia-Hays
(Mm-K^{+}, *mm-K)*	Micromelia-Kawhara
(Mm-VII^{+}, *mm-VII)*	Micromelia VII
Mub^{+}, *mub*	Missing upper beak
Mx^{+}, *mx*	Missing maxillae
Nm^{+}, *nm*	Nanomelia
(Obs^{+}, *obs)*	Open breast syndrome
(Per^{+}, *per)*	Perocephaly
Pn^{+}, *pn*	Prenatal lethal
(Sex^{+}, *sex)*	Sex-linked lethal-Bernier
Sf^{+}, *sf*	Splitfoot
Sm^{+}, *sm*	Short mandible
(Stu^{+}, *stu)*	Stumpy
Su^{+}, *su*	Short upper beak
Sy^{+}, *sy*	Stickiness
Ta-1^{+}, *ta-1*	Talpid-1
Ta-2^{+}, *ta-2*	Talpid-2
Ta-3^{+}, *ta-3*	Talpid-3
Wg^{+}, *wg*	Wingless
Wg-2^{+}, *wg-2*	Wingless-2
(MF)	Micromelia-Asmundson

MUSCULOSKELETAL MUTATIONS

By, by^{+}	Brachydactyly
Cp, cp^{+}	Creeper
(Crn^{+}, *crn)*	Crooked neck
(Crt^{+}, *crt)*	Congenital crooked toes
Kf_H, kf_H^{+}	Skull tuberosity
Mp, mp^{+}	Ametapodia
Po, Po^{d}, *po*$^{+}$	Polydactyly, duplicate polydactyly
Po-2^{+}, *po-2***	Recessive polydactyly
Psp^{+}, *psp*	Polydactyly-syndactyly-ptilopody
Pt^{+}, *pt***	Palatial pits
Rp, rp^{+}	Dominant rumplessness
Rp-2^{+}, *rp-2*	Recessive rumplessness
Shl^{+}, *shl*	Shankless
Sno^{+}, *sno*	Snub nose
(Syn, syn^{+}*)*	Syndactyly
(Wg-3^{+}, *wg-3)*	Autosomal wingless
Wl^{+}, *wl***	Sex-linked wingless
(MF)	Cleft palate
(MF)	Crooked beak
(MF)	Crooked keel
(MF)	Crooked toes
(MF)	Kyphoscoliosis
(MF)	Malformed skeleton
(MF)	Tibial dyschondroplasia
(MF)	Ungual osteodystrophy
(MF)	Web-foot

BODY SIZE MUTATIONS

Adw^{+}, *adw*	Autosomal dwarfism
Dw^{+}, *dw*, $dw^{B, M}$	Sex-linked dwarfism
Rg^{+}, *rg*	Recessive sex-linked drawfism
Td^{+}, *td*	Recessive dwarfism
Z, z^{+}	Dominant sex-linked drawfism

EGG SHELL COLOR MUTATIONS

O, o^{+}	Blue egg shell
Pr^{+}, *pr*	Protoporphyrin inhibitor
(MF)	Brown egg shell
(MF)	White egg shell

EYE COLOR MUTATIONS

Br^{+}, *br*	Brown eye
(UNK)	Pearl eye
(UNK)	Red eye

SKIN COLOR MUTATIONS

Fm, fm^{+}	Fibromelanosis-black skin
G^{+}, *g*	Yellow head
Id, $id^{a, c, +}$	Dermal melanin inhibitor
W^{+}, *w*	White and yellow skin color
Y^{+}, *y*	Recessive white skin
(MF)	Red earlobes
(MF)	White earlobes

SKIN STRUCTURE MUTATIONS

As, as^{+}	Auxiliary spurs
Bd^{+}, *bd*	Breda comb (combless)
$D^{B, V}$, d^{+}	Cup-, V-type duplex comb
(Dgp^{+}, *dgp)*	Double oil gland papillae
Ds, ds^{+}	Double spurs
Et, et^{+}	Ear-tuft
He^{+}, he^{f**}	Rugged-smooth rose comb
M, m^{+}	Multiple spurs
P, p^{+}	Pea comb
R, r^{+}	Rose comb
(Sb^{+}, *sb)*	Spike blade comb
Se^{+}, *se*	Sleepy-eye
Sl^{+}, *sl*	Spurlessness
U, u^{+}	Uropygial

(MF)	Comb side sprigs
(MF)	Self dubbing
(MF)	Walnut, cushion, strawberry comb (*R, P*)
(UNK)	Bent rose comb spike
(UNK)	Enlarged earlobes-white faces
(UNK)	Ingrown rose comb spike
(UNK)	Rose comb spike extended vs down
(UNK)	Split comb
(UNK)	Triple spiked rose comb
(UNK)	Spurred females

FEATHER GROWTH RATE MUTATIONS

Dr^{+}, *dr*	Dysplastic remiges
$K^{n, s}$, *K, k*$^{+}$	Rate of feathering
T^{+}, t^{s}, *t*	Retarded-tardy feather growth
(MF)	Modified slow feathering
(UNK)	Defective feathering DAM

FEATHER LENGTH MUTATIONS

Cr, cr^{+}	Crest, tassel
Gt, gt^{+}	Non-limited growth-long tail
Lf, lf^{+}	Long filoplumes
Mb, mb^{+}	Muffs and beard
Mt^{+}, *mt*	Non-molt-long tail
V^{+}, *v*	Vulture hocks
(UNK)	Long saddle feathers

FEATHER DISTRIBUTION MUTATIONS

Af^{+}, *af*	Abnormal feathering
Ap, ap^{+}	Apterylosis
Ba^{+}, *ba*	Congenital baldness
N^{+}, *n*	Sex-linked naked
Na, na^{+}	Naked neck
Nk^{+}, *nk*	Ottawa naked
Sc^{+}, *sc*	Scaleless
Sf1, sf1^{+}	Surplus primaries-1
Sf2, sf2^{+}	Surplus primaries-2
(MF)	Ptilopody (feathered shanks)
(MF)	Stubs

FEATHER STRUCTURE MUTATIONS

F, f^{+}	Frizzling
Fl, fl^{+}	Flightless
Fr^{+}, *fr*	Fray
H^{+}, *h*	Silkiness
Hf, hf^{+}	Hen feathering
Hy, hy^{+}	Hypoplastic tail feathers
Mf^{+}, *mf*	Frizzle modifier
Pc^{+}, *pc*	Porcupine
(Ropy^{+}, *ropy)*	Ropey
(Rw^{+}, *rw)*	Ragged wing
Sn^{+}, *sn*	Sunsuit
(St^{+}, *st)*	Stringy
(St-2^{+}, *st-2)*	Stringy-2
(Wi^{+}, *wi)*	Wiry syndrome
Wo^{+}, *wo*	Woolly
Wt^{+}, *wt*	Wry tail
(MF)	Matted down feathers
(UNK)	Split wing
(UNK)	Wing patch

FEATHER COLOR MUTATIONS

B, B^{Sd}, *b*$^{+}$	Sex-linked barring, dilution
Bh, bh^{+}	Black head
Bl, bl^{+}	Blue
C^{+}, *c*, c^{re}, c^{a}	Recessive white, red-eyed white, autosomal albinism
Cb, cb^{+}	Champagne blond
Co, co^{+}	Columbian restriction
Db, db^{+}	Columbian-like restriction
Dil, dil^{+} **	Dilute
E, E^{R}, e^{Wh}, +, ...	*E* locus primary feather pattern
....$e^{b, s, bc, y}$	*E* locus (continue)
Er, er^{+}	Erminette
(Ge^{+}, *ge)*	Grey
Gr, gr^{+}	Ginger
(Hs, hs^{+}*)*	Heap spot
I, I^{D}, i^{+}	Dominant white, dun
Ig^{+}, *ig*	Cream
Ko^{+}, *ko*	Head streak
Lav^{+}, *lav*	Lavender
(Lb^{+}, *lb)*	Light bar
Li, li^{+}	Light down
Mh, mh^{+}	Mahogany
Ml, ml^{+}	Melanotic
Mo^{+}, *mo*, mo^{pi}	Mottling (Mille Fleur, Speckling), pied
Pb^{+}, *pb*	Recessive black
Pg, pg^{+}	Pattern gene-pencilling
Pk^{+}, *pk*	Pink eye
Rs^{+}, *rs*	Red-splashed white
S, s^{+}, *al*	Silver, gold, albinism
Sg^{+}, *sg*	Non-stippling
(Smd^{+}, *smd)*	Smoky down
Sw^{+}, *sw*	Snow white down

Ws^{+}, *ws*	Wing-spot	*(MF)*	Red-brown-buff complex
Ww, *ww*$^{+}$	White-wing lethal	*(MF)*	Spangling (*Db*, *Pg*, *Ml*)
(MF)	Autosomal barring (*Db*, *Pg*)	*(MF)*	White Leghorn headspot
(MF)	Delayed amelanosis	*(UNK)*	Buff restriction
(MF)	Double lacing (*Pg*, *Ml*)	*(UNK)*	Half-moon spangle
(MF)	Lacing (*Pg*, *Ml*, *Co*)	*(UNK)*	Lakenvelder restriction
(MF)	Quail pattern (*Ml*, *Co*)	*(UNK)*	Red saddle
(MF)	Marbled down (*E*, *S*, *Db*)	*(UNK)*	White crest

JAPANESE QUAIL

(Coturnix coturnix japonica)

GENE[1, 2]	*TRAIT NAME*
BIOCHEMICAL MUTATIONS	
Acp-1[A, B]	Acid phosphatase-1-liver
Acp-2[A, B]	Acid phosphatase-2-liver
Adh[a - c]	Alcohol dehydrogenase-liver
Akp-1[A, B]	Alkaline phosphatase-1-serum
Akp-2[A, C]	Alkaline phosphatase-2-serum
Akp-5[F, S]	Alkaline phosphatase-5-serum
Alb[Q_1, Q_2]	Albumin-serum
Amy-1[A, B]	Amylase-serum
Amy-2[A, B **]	Amylase-pancreas
(Cat[A, B]*)*	Catalase-egg albumen
Ct[F, S]	Catalase-liver
Es[A, B]	Esterase-liver
Es-1[F, S]	Esterase-1-red cell
Es-2[A - C]	Esterase-2-liver
Es-3[F, S]	Esterase-3-red cell
Es-4[A, B]	Esterase-4-pancreas
Es-5[A, 0]	Esterase-5-serum
Es-6[A - C]	Esterase-6-red cell
Es-7[A, 0]	Esterase-7-serum
Es-8[A, 0]	Esterase-8-serum
Es-II[A, B]	Esterase-II-cerebral
Es-D[F, S]	Esterase-D-red cell
Gdh[A, B]	Glutamate dehydrogenase
Ld	Lactate dehydrogenase
Me-1[A, B]	Malic-1
Mpi-1[A, B]	Mannose phosphate isomerase-1
Ov[1 - 4]	Ovalbumin
Ov-1[A, B]	Ovalbumin-1
Ovm[S, G]	Ovomucoid
Pa-1[A - C]	Prealbumin-1
Pa-2[A, B]	Prealbumin-2
Pa-3[A - D]	Prealbumin-3
Pa-4[A, B]	Prealbumin-4
Pdh[F, S]	Glucose-6-phosphate dehydrogenase-red cell
Pgd[a - d]	Phosphogluconate dehydrogenase
Pgi[F, S, S_2]	Phosphoglucose isomerase-red cell
Poa-1[A, B]	Postalbumin-1
Ptf[A, B]	Pretransferrin
Pv[A, B]	Phosphovitin
Sdh[A, B]	Sorbitol dehydrogenase
Tf[A - C]	Transferrin-conalbumin
Vg	Vitellogenin
IMMUNOLOGICAL MUTATIONS	
(Ea-H)	Erythrocyte alloantigen H
(Ea-QN)	Erythrocyte alloantigen QN
(Ea-R)	Erythrocyte alloantigen R
Ht, ht[+]	*Helianthus tuberosus* agglutinogen
Ly[1, 2]	Lymphocyte antigen
Ns, ns[+]	*Naematoloma sublateritium* agglutinogen
Pn, pn[+]	Peanut agglutinogen
Ps, ps[+]	*Pisum sativum* agglutinogen
Sb-1, sb-1[+ **]	Soybean agglutinogen
Sn, sn[+]	Soybean agglutinogen
METABOLIC MUTATIONS	
(GlyII[+]*, glyII)*	Glycogenosis type II
Hb-1[A, B]	Hemoglobin-1
(Tw, tw[+]*)*	Twinning
(MF)	Susceptibility to ulcerative enteritis
NEUROLOGICAL MUTATIONS	
Dn[+]*, dn*	Dark feather nervous disorder
Lo[+]*, lo*	Congenital loco
Sg[+]*, sg*	Star gazer
EMBRYONIC LETHAL MUTATIONS	
Ab[+]*, ab*	Abnormal head
Ar[+]*, ar*	Arostroperocephaly
Ch[+]*, ch*	Chondrodystrophy
Ch-2	Chondrodystrophy-2
Cn[+]*, cn*	Crooked neck dwarf
M[+]*, m*	Micromelia
EGG SHELL COLOR MUTATIONS	
R, r[+]	Red egg shell
We[+]*, we*	White egg shell
(MF)	Egg shell marking
MUSCULOSKELETAL MUTATIONS	
Lb[+]*, lb*	Long beak
(MF)	Crooked neck
(MF)	Crooked toes
(MF)	Wry neck
FEATHER GROWTH AND STRUCTURE MUTATIONS	
Df, df[+]	Defective feathers
Mdf[+]*, mdf*	Regulates *Df*
Pc[+]*, pc*	Porcupine feathers

Rt^+, rt	Rough-textured
Sb^+, sb	Short distal barbs
(MF)	Downless

FEATHER COLOR MUTATIONS

(A^+, a)	Perfect albinism
$Al^+, al^{D,c}, al$	Dilute, cinnamon, imperfect albinism
B, b^+	Silver feathered
Bd^+, bd^w	White beard
Bh, bh^+	Black-at-hatch
Bi^+, bi	White bib
Bl^+, bl	Bleu
Br^+, br^{**}	Recessive brown
C^+, c	White-feathered down
Cin^+, cin^{**}	Autosomal cinnamon
Cr^+, cr	White crescent
D, d^+	Black
(Dil, dil^+)	Dominant dilute
E, e^+, rh	Extended brown, red-head
(Ma^+, ma)	Marbled plumage
P^+, p	Brown-splashed white
Pk^+, pk	Buff
Ro^+, ro	Roux
Rs^+, rs	Recessive silver
S^+, s	Panda
W, w^+	Incompletely dominant white
Wb^+, wb	White-breasted
Wh^+, wh	Recessive white
Wp^+, wp	White primaries
Y, y^+	Yellow
(UNK)	Autosomal dilute
(UNK)	Fawn

TURKEY

(Meleagris gallopavo)

GENE[1, 2]	*TRAIT NAME*
BIOCHEMICAL MUTATIONS	
(Akp-3)	Aklaline phosphatase-3
(Akp[2, 3]*)*	Alkaline phosphatase modifier
Alb[A, B]	Albumin-serum
Ldh[S, F]	Lactate dehydrogenase
IMMUNOLOGICAL MUTATIONS	
(Ea-A[1 - 6]*)*	Erythrocyte alloantigen A
(Ea-C[1 - 3]*)*	Erythrocyte alloantigen C
(Ea-F[1 - 3]*)*	Erythrocyte alloantigen F
(Ea-J)	Erythrocyte alloantigen J
(Ea-K)	Erythrocyte alloantigen K
(Ea-L)	Erythrocyte alloantigen L
(Ea-Q)	Erythrocyte alloantigen Q
ONCOGENE MUTATION	
c-rel	For avian reticuloendotheliosis virus
METABOLIC MUTATIONS	
(Bh$^+$*, bh)*	Bowed-hocks
Bn$^+$*, bn*	Binucleated erythrocytes
Dy$^+$*, dy*	Muscular dystrophy
(Ga$^+$*, ga)*	Hereditary glaucoma
(MF)	Breast width
(MF)	Degenerative muscle myopathy
(MF)	Pendulous crop
(UNK)	Crooked toes
NEUROLOGICAL MUTATIONS	
Bo$^+$*, bo*	Bobber
Lo$^+$*, lo*	Congenital loco
Vi$^+$*, vi*	Vibrator
EMBRYONIC LETHAL MUTATIONS	
Ch$^+$*, ch*	Chondrodystrophy
Ch-m$^+$*, ch-m***	Chondrodystrophy-m
(Cn$^+$*, cn)*	Crooked neck dwarf
Hm$^+$*, hm*	Hemimelia
(Mm$^+$*, mm)*	Micromelia-like
Rl$^+$*, rl*	Ring lethal
S$^+$*, s*	Short long bones
Sdp$^+$*, sdp*	Swollen down plumules
(Sh$^+$*, sh)*	Short spined
SKIN COLOR MUTATION	
M$^+$*, m*	Dermal melanosis
FEATHER GROWTH AND STRUCTURE MUTATIONS	
Ha$^+$*, ha*	Hairy plumage
K, k$^+$	Late feathering
Kn$^+$*, kn*	Knobby down feathers
Na$^+$*, na*	Naked
FEATHER COLOR MUTATIONS	
(A$^+$*, a)*	Autosomal albinism
B, b$^+$*, l*	Black, black-winged
C$^+$*, c, c*^{g}	White, gray
D, d$^+$	Dominant slate
E$^+$*, e*	Brown
(Fb$^+$*, fb)*	Faded bronze
N$^+$*, n, n*^{a}	Narragansett, albino
P$^+$*, p*	Palm
R$^+$*, r*	Red
Sl$^+$*, sl*	Slate
Sp$^+$*, sp*	Spotting
(MF)	Snow white down (*c, B* or *c, b*^{l})

FOOTNOTES

[1] Each allele designation separated by a comma.

[2] Co-dominant alleles and alleles inclusive of letters or numbers indicated.

** Gene symbol changed; previous symbol either does not conform to symbolism convention or has been used previously to identify another locus.

( ) No gene symbol previously assigned; provisional gene symbol proposed.

(*MF*) Trait inherited as a multiple factoral trait.

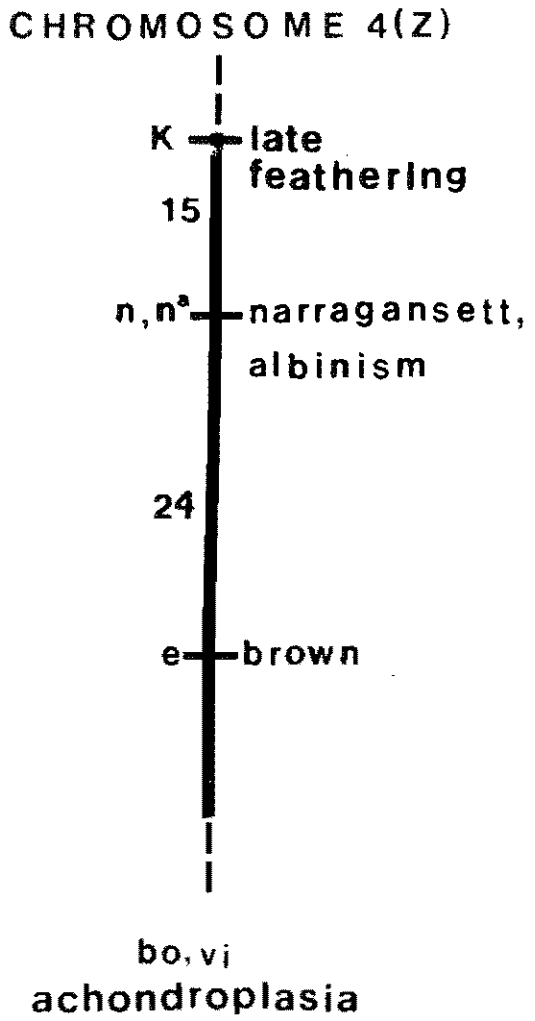
(*UNK*) Inherited basis unknown.

"....knowing the linkage relationships of the genes involved, the breeder can predict results, can determine the simplest way to attain his objectives, and can see in advance the scope of the operation necessary to that end."

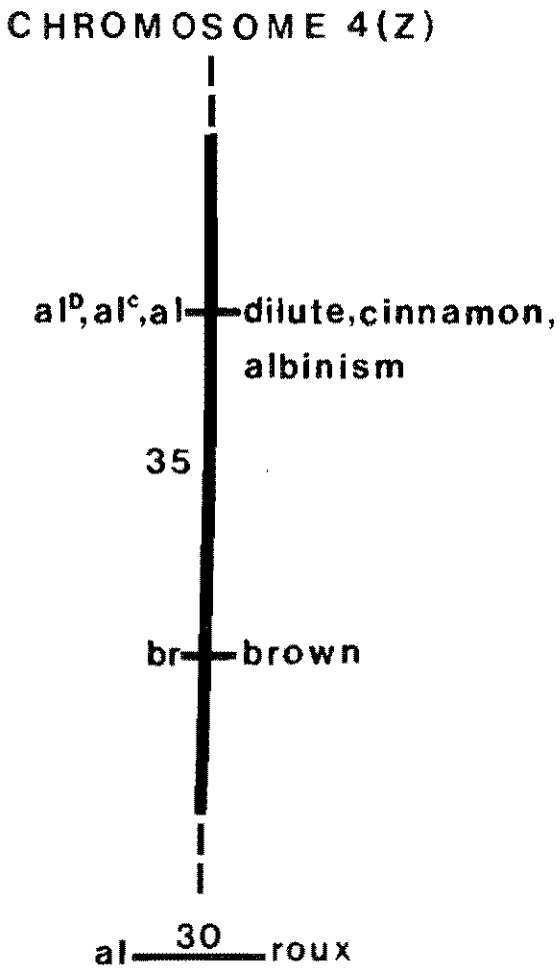
Frederick B. Hutt

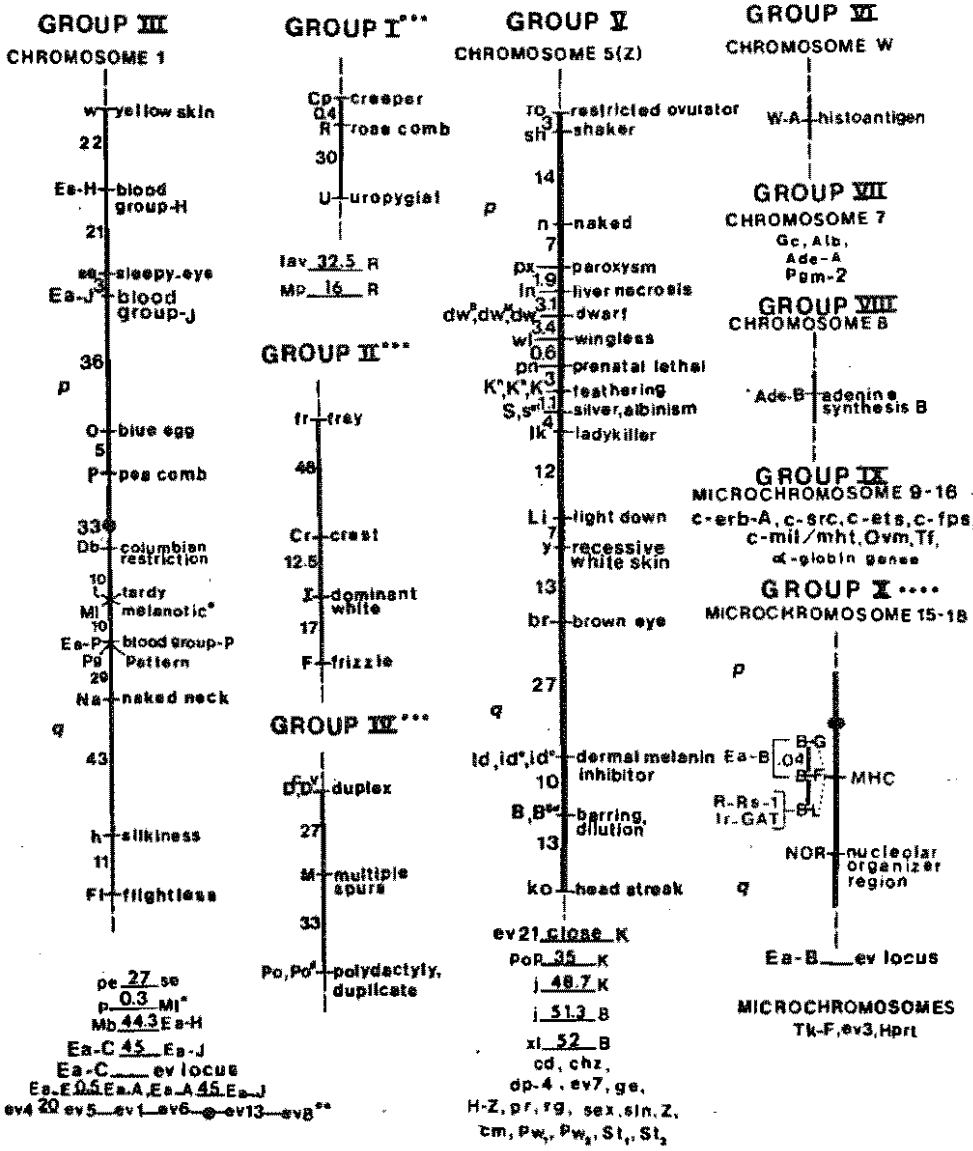
IV. CHROMOSOME LINKAGE MAPS

TURKEY



JAPANESE QUAIL





* Two conflicting reports on the P–Ml linkage.

** The ev4 locus is near the end of the long arm and ev8 is in the middle of the short arm of chromosome 1.

*** The shl locus is in the proximal region and the ev2 locus is on the long arm of chromosome 2, and the ev14 locus is on the long arm of chromosome 3. The Ov locus is presumed to be on either chromosome 2 or 3 and the c-erb-B locus on chromosome 2. In two conflicting reports, one places c-myc on chromosome 2 and c-myb on either chromosome 2 or 3 while the other report places both of these loci on microchromosomes of size 13-16. Presumably all these loci are part of linkage groups I, II or IV. The four linked B-type globin genes are on either chromosome 1 or 2 and thus are part of linkage groups I, II, III or IV.

**** The suborder of the MHC complex relative to the NOR is unknown.

"Breeds and varieties were created from mutant genes and thus have become living reservoirs of these genes, holding them for use in future generations of mankind."
Anon.

V. BREEDS AND VARIETIES

CHICKEN

(Gallus domesticus)

527 AMERAUCANA, BLACK
CHARACT: EGG: blue (*O*) --SKIN: white (W^+) -- COMB: pea (*P*) -- EYES: brown (*br*) -- EARLOBES: red -- SHANKS: black (id^+) -- PLUMAGE: black, see section VI-1 -- OTHER: muffs and beard (*Mb*).
SOURCE: 155,

528 AMERAUCANA, BLUE WHEATEN
CHARACT: Same as Black Ameraucana, except EYES: reddish bay -- SHANKS: bluish slate (id^+) -- PLUMAGE: blue color phase of wheaten, see section VI-4b.
SOURCE: 173,

529 AMERAUCANA BANTAM, WHEATEN
CHARACT: Same as Blue Wheaten Ameraucana, except PLUMAGE: wheaten, see section VI-4 -- OTHER: smaller body.
SOURCE: 167, 173, 175,

530 AMERAUCANA BANTAM, WHITE
CHARACT: Same as Blue Wheaten Ameraucana Bantam, except PLUMAGE: white, see section VI-1i, 2e, 4f, 5i, and 7e.
SOURCE: 175,

531 AMERAUCANA BANTAM, VARIOUS COLORS
CHARACT: Same as Wheaten Ameraucana Bantam, except PLUMAGE: various colors.
SOURCE: 168,

532 AMERICAN GAME BANTAM, BLACK BREASTED RED
CHARACT: EGGS: cream -- SKIN: white (W^+) -- COMB: single -- EYES: red -- EARLOBES: red -- SHANKS: bluish slate (id^+) -- PLUMAGE: black breasted red, see section VI-3 -- OTHER: temperament gamey, small body size.
SOURCE: 259,

533 AMERICAN PIT GAMES, VARIOUS COLORS
CHARACT: Similar to Old English Games but segregating for plumage colors.
SOURCE: 170,

534 ANCONA, SINGLE COMB
CHARACT: EGGS: white -- SKIN: yellow (*w*) -- COMB: single -- EYES: reddish bay -- EARLOBES: white -- SHANKS: yellow (*Id*) -- PLUMAGE: mottled, black with a small white tip, see section VI-1d.
SOURCE: 41, 71, 80, 93, 127, 164, 172, 210, 255,

535 ANCONA BANTAM, SINGLE COMB
CHARACT: Same as Single Comb Ancona, except smaller body.
SOURCE: 41, 80, 164, 234,

536 ANCONA, ROSE COMB
CHARACT: Same as Single Comb Ancona, except COMB: rose (*R*).
SOURCE: 80,

537 ANCONA BANTAM, ROSE COMB
CHARACT: Same as Rose Comb Ancona, except smaller body.
SOURCE: 80,

538 ANDALUSIAN, BLUE
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: single -- EYES: reddish bay -- EARLOBES: white -- SHANKS: dark slaty blue (id^+) -- PLUMAGE: slaty blue, see section VI-1b.
SOURCE: 41, 43, 54, 71, 127, 164, 174, 228, 235, 245,

539 ANDALUSIAN BANTAM, BLUE
CHARACT: Same as Blue Andalusian, except smaller body.
SOURCE: 41,

540 ANDALUSIAN, BLACK (ANDALUZA NEGRA)
CHARACT: EGGS: white -- SKIN: yellow (*w*) -- COMB: single -- EYES: reddish bay -- EARLOBES: white -- SHANKS: yellow (*Id*) -- PLUMAGE: black, see section VI-1.
SOURCE: 43,

541 ANDALUSIAN, BLACK BREASTED RED (ANDALUZA PERDIZ)
CHARACT: Same as Black Andalusian, except PLUMAGE: black breasted red; see section VI-3.
SOURCE: 43,

542 ANDALUSIAN, BARRED (ANDALUZA FRANCISCA)
CHARACT: Same as Black Andalusian, except PLUMAGE: sex-linked barred, see section VI-1e.
SOURCE: 43,

543 APPENZELLER SPITZHAUBEN, SILVER SPANGLED
CHARACT: EGG: white -- SKIN: white (W^+) -- COMB: duplex (*D sup* v.) -- EYES: brown (*br*) -- EARLOBES: white -- SHANKS: slate (id^+) -- PLUMAGE: white, each feather ending with a black spangle, see section VI-1i -- OTHER: helmet-shaped crest (*Cr*).
SOURCE: 60, 71, 95, 164,

544 ARAUCANA, BLACK
CHARACT: EGGS: blue (*O*) -- SKIN: yellow (*w*) -- COMB: pea (*P*) -- EYES: brown (*br*) -- EARLOBES: white -- SHANKS: black (id^+) -- PLUMAGE: black, see section VI-1 -- OTHER: some have ear tufts (*Et*); others are rumpless (*Rp*), or both, or neither.
SOURCE: 155, 216,

545 ARAUCANA BANTAM, BLACK
CHARACT: Same as Black Araucana, except smaller body.
SOURCE: 51,

546 ARAUCANA BANTAM, BIRCHEN
CHARACT: Same as Black Araucana Bantam, except EYES: reddish bay -- SHANKS: willow -- PLUMAGE: birchen, see section VI-2.
SOURCE: 206,

547 ARAUCANA, BLACK BREASTED RED
CHARACT: Same as Black Araucana, except EYES: reddish bay -- SHANKS: willow (id^+) -- PLUMAGE: black breasted red, see section VI-3.
SOURCE: 216, 248,

548 ARAUCANA BANTAM, BLACK BREASTED RED
CHARACT: Same as Black Breasted Red Araucana, except smaller body size.
SOURCE: 248,

549 ARAUCANA, BLUE
CHARACT: Same as Black Breasted Red Araucana, except SHANKS: swarthy horn -- PLUMAGE: blue, see section VI-1b.
SOURCE: 216,

550 ARAUCANA BANTAM, BLUE GOLDEN DUCKWING
CHARACT: Same as Black Breasted Red Araucana Bantam, except PLUMAGE: blue color phase of black breasted red, see section VI-3e.
SOURCE: 206, 248,

551 ARAUCANA, BLUE RED
CHARACT: Same as Black Breasted Red Araucana, except PLUMAGE: blue color phase of black breasted red, see section VI-3e.
SOURCE: 51,

552 ARAUCANA BANTAM, BLUE RED
CHARACT: Same as Blue Red Araucana, except smaller body.
SOURCE: 51, 248,

553 ARAUCANA, CUCKOO
CHARACT: Same as Black Breasted Red Araucana, except PLUMAGE: slightly modified sex-linked barred, see section VI-1e.
SOURCE: 54,

554 ARAUCANA, GOLDEN DUCKWING
CHARACT: Same as Black Breasted Red Araucana, except PLUMAGE: silver color phase of black breasted red, see section VI-3c.
SOURCE: 51,

555 ARAUCANA BANTAM, GOLDEN DUCKWING
CHARACT: Same as Golden Duckwing Araucana, except smaller body.
SOURCE: 206, 248,

556 ARAUCANA, LAVENDER
CHARACT: Same as Black Breasted Red Araucana, except PLUMAGE: light slaty blue, see section VI-1a.
SOURCE: 71,

557 ARAUCANA BANTAM, LAVENDER
CHARACT: Same as Lavender Araucana, except smaller body.
SOURCE: 54,

558 ARAUCANA, LIGHT BROWN
CHARACT: Same as Black Breasted Red Araucana, except PLUMAGE: black breasted red, see section VI-3a.
SOURCE: 41,

559 ARAUCANA BANTAM, SILVER BLUE
CHARACT: Same as Black Breasted Red Araucana Bantam, except PLUMAGE: blue color phase of birchen, see section VI-2b.
SOURCE: 206,

560 ARAUCANA, SILVER DUCKWING
CHARACT: Same as Black Breasted Red Araucana, except PLUMAGE: silver color phase of black breasted red, see section VI-3c.
SOURCE: 51,

561 ARAUCANA BANTAM, SILVER DUCKWING
CHARACT: Same as Silver Duckwing Araucana, except smaller body size.
SOURCE: 248,

562 ARAUCANA BANTAM, WHITE RUMPLESS
CHARACT: Same as Black Breasted Red Araucana Bantam, except PLUMAGE: white, see section VI-1j and 3i.
SOURCE: 211,

563 ARAUCANA, VARIOUS COLORS
CHARACT: Same as Black Breasted Red Araucana, except PLUMAGE: various colors.
SOURCE: 3, 4, 36, 98, 117, 127, 168, 164, 165, 167, 180, 196, 200, 209, 210, 211, 228, 258,

564 ARAUCANA BANTAM, VARIOUS COLORS
CHARACT: Same as various colors Araucana, except smaller body size.
SOURCE: 164, 165, 211,

565 ASEEL GAME (ASIL), VARIOUS COLORS
CHARACT: EGGS: tinted -- SKIN: yellow (*w*) or pinkish white (W^+) -- COMB: pea (*P*) -- EYES: pearl -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: various colors -- OTHER: temperament, very aggressive fighters; body Cornish type, but smaller.
SOURCE: 4, 41, 164, 185,

566 ASEEL GAME, BLACK
CHARACT: Same as Aseel Game, except PLUMAGE: black, see section VI-1.
SOURCE: 122,

567 ASEEL GAME, BLACK BREASTED RED
CHARACT: Same as Aseel Game, except PLUMAGE: black breasted red, see section VI-3.
SOURCE: 122,

568 ASEEL GAME, DARK RED
CHARACT: Same as Aseel Game, except PLUMAGE: red "black-tailed" columbian, see section VI-4c and 7c.
SOURCE: 122,

569 ASEEL GAME, GHAN
CHARACT: Same as Aseel Game, except PLUMAGE: reddish mahogany, dark double laced, see section VI-7b.
SOURCE: 185,

570 ASEEL GAME, RAJAH
CHARACT: Same as Aseel Game, except a bit larger in size -- PLUMAGE: spangled black breasted red, see section VI-3g.
SOURCE: 70, 185,

571 ASEEL GAME, RAMPUR
CHARACT: Same as Aseel Game, but more slender in build -- PLUMAGE: black, see section VI-1.
SOURCE: 113,

572 AUGSBURGER
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: duplex (D^V) -- EYES: dark -- EARLOBES: white -- SHANKS: dark slate (Id^+) -- PLUMAGE: black, see section VI-1.
SOURCE: 49,

573 AUSTRALORP, BLACK
CHARACT: EGGS: brown -- SKIN: white (W^+) -- COMB: single -- EYES: brown (br) -- EARLOBES: red -- SHANKS: dark slate; bottom of feet white (Id) -- PLUMAGE: black, see section VI-1.
SOURCE: 41, 91, 98, 127, 164, 169, 228, 241, 258,

574 AUSTRALORP BANTAM, BLACK
CHARACT: Same as Black Australorp, except smaller body.
SOURCE: 41, 73,

575 AUSTRALORP, BLUE
CHARACT: Same as Black Australorp, except PLUMAGE: blue, see section VI-1b.
SOURCE: 41,

576 AUSTRALORP BANTAM, BLUE
CHARACT: Same as Blue Australorp, except smaller body.
SOURCE: 41,

577 AUSTRALORP, GOLDEN
CHARACT: Same as Black Australorp, except EYES: reddish bay -- PLUMAGE: dark chestnut red "black-tailed" columbian, see section VI-4c.
SOURCE: 41,

578 AUSTRALORP, WHEATEN LACED
CHARACT: Same as golden Australorp, except PLUMAGE: male hackle rust gold and black; back, wingbow, wing and tail coverlets, and sickles beetle-green black. Female hackle yellow gold and black; shoulders, back, saddle and wing light red wheaten with black lacing.
SOURCE: 41,

579 AUSTRALORP, WHITE
CHARACT: Same as Black Australorp, except PLUMAGE: white, see section VI-1j.
SOURCE: 41, 98, 164,

580 AUSTRALORP BANTAM, WHITE
CHARACT: Same as White Australorp, except smaller body.
SOURCE: 41,

581 BARNEVELDER, DOUBLE LACED
CHARACT: EGGS: brown -- SKIN: yellow (w) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (Id) -- PLUMAGE: double laced, see section VI-5h.
SOURCE: 8, 60, 71, 164,

582 BARNEVELDER BANTAM, DOUBLE LACED
CHARACT: Same as Double Laced Barnevelder, except smaller body size.
SOURCE: 8,

583 BELGIAN BEARDED d'ANVERS BANTAM, BLACK (ANTWERP BELGIAN BANTAM, BARBU d'ANVERS BANTAM)
CHARACT: EGGS: brown -- SKIN: white (W^+) -- COMB: rose (R) -- EYES: black -- EARLOBES: red -- SHANKS: bluish slate (Id^+) -- PLUMAGE: black, see section VI-1 -- OTHER: muffs and beard (Mb) and small body size.
SOURCE: 4, 51, 54, 71, 253,

584 BELGIAN BEARDED d'ANVERS BANTAM, BLACK BREASTED RED
CHARACT: Same as Black Belgian Bearded d'Anvers Bantam, except EYES: reddish bay -- PLUMAGE: black breasted red, see section VI-3.
SOURCE: 51,

585 BELGIAN BEARDED d'ANVERS BANTAM, BLUE QUAIL
CHARACT: Same as Black Belgian Bearded d'Anvers Bantam, except EYES: dark brown (br) -- PLUMAGE: blue color phase of quail pattern, see section VI-8a.
SOURCE: 54,

586 BELGIAN BEARDED d'ANVERS BANTAM, BLUE RED
CHARACT: Same as Black Breasted Red Belgian Bearded d'Anvers Bantam, except PLUMAGE: blue color phase of black breasted red, see section VI-3e.
SOURCE: 51,

587 BELGIAN BEARDED d'ANVERS BANTAM, CUCKOO
CHARACT: Same as Black Breasted Red Belgian Bearded d'Anvers Bantam, except PLUMAGE: slightly modified sex-linked barred, see section VI-1e.
SOURCE: 51,

588 BELGIAN BEARDED d'ANVERS BANTAM, LACED BLUE
CHARACT: Same as Blue Quail Belgian Bearded d'Anvers Bantam, except PLUMAGE: slaty blue, see section VI-1b.
SOURCE: 54,

589 BELGIAN BEARDED d'ANVERS BANTAM, MILLE FLEUR
CHARACT: Same as Black Breasted Red Belgian Bearded d'Anvers Bantam, except EYES: reddish bay -- PLUMAGE: speckled, golden buff, see section VI-5f.
SOURCE: 51, 99,

590 BELGIAN BEARDED d'ANVERS BANTAM, QUAIL
CHARACT: Same as Blue Quail Belgian Bearded d'Anvers Bantam, except PLUMAGE: quail, see section VI-8.
SOURCE: 51, 54, 62, 71, 94, 127, 150, 164, 165, 175, 228, 258,

591 BELGIAN BEARDED d'ANVERS BANTAM, PORCELAIN
CHARACT: Same as Black Breasted Red Belgian Bearded d'Anvers Bantam except PLUMAGE: speckled, beige, see section VI-5f.
SOURCE: 51, 62,

592 BELGIAN BEARDED d'ANVERS BANTAM, SELF BLUE
CHARACT: Same as Blue Quail Belgian Bearded d'Anvers Bantam, except PLUMAGE: light slaty blue, see section VI-1a.
SOURCE: 51, 62,

593 BELGIAN BEARDED d'ANVERS BANTAM, SILVER QUAIL
CHARACT: Same as Blue Quail Belgian Bearded d'Anvers Bantam, except PLUMAGE: silver color phase of quail pattern, see section VI-8b.
SOURCE: 54,

594 BELGIAN BEARDED d'ANVERS BANTAM, WHITE
CHARACT: Same as Black Breasted Red Belgian Bearded d'Anvers Bantam, except PLUMAGE: white (c), see section VI-1j and 5i.
SOURCE: 51,

595 BELGIAN BEARDED d'ANVERS BANTAM, VARIOUS COLORS
CHARACT: Same as Black Belgian Bearded d'Anvers Bantam, except PLUMAGE: various colors.
SOURCE: 41,

596 BELGIAN BEARDED d'UCCLE BANTAM, BLACK (BARBU d'UCCLE BANTAM)
CHARACT: EGGS: brown -- SKIN: white (W^+) -- COMB: single -- EYES: black -- EARLOBES: red -- SHANKS: bluish slate (id^+) -- PLUMAGE: black, see section VI-1 -- OTHER: muffs and beard (Mb) -- vulture hocks (v) feathered shanks and small body size.
SOURCE: 51, 184,

597 BELGIAN BEARDED d'UCCLE BANTAM, BLUE
CHARACT: Same as Black Belgian Bearded d'Uccle Bantam, except EYES: dark brown (br) -- PLUMAGE: blue, see section VI-1b.
SOURCE: 51,

598 BELGIAN BEARDED d'UCCLE BANTAM, BROWN RED
CHARACT: Same as Black Belgian Bearded d'Uccle Bantam, except EYES: reddish bay -- PLUMAGE: gold color phase of birchen, see section VI-2a.
SOURCE: 184,

599 BELGIAN BEARDED d'UCCLE BANTAM, BUFF COLUMBIAN
CHARACT: Same as Brown Red Belgian Bearded d'Uccle Bantam, except PLUMAGE: columbian gold color phase, see section VI-5d.
SOURCE: 184,

600 BELGIAN BEARDED d'UCCLE BANTAM, CUCKOO
CHARACT: Same as Brown Red Belgian Bearded d'Uccle Bantam, except PLUMAGE: slightly modified sex-linked barred, see section VI-1e.
SOURCE: 51,

601 BELGIAN BEARDED d'UCCLE BANTAM, GOLDEN NECK
CHARACT: Same as Brown Red Belgian Bearded d'Uccle Bantam, except PLUMAGE: golden, each feather ending with a white spangle, see section VI-1i.
SOURCE: 184,

602 BELGIAN BEARDED d'UCCLE BANTAM, MILLE FLEUR
CHARACT: Same as Brown Red Belgian Bearded d'Uccle Bantam, except PLUMAGE: speckled, golden buff, see section VI-5f.
SOURCE: 4, 41, 62, 64, 78, 87, 95, 127, 150, 151, 164, 175, 176, 193, 195, 211, 228, 258,

603 BELGIAN BEARDED d'UCCLE BANTAM, MOTTLED
CHARACT: Same as Black Belgian Bearded d'Uccle Bantam, except PLUMAGE: mottled, black with a small white tip, see section VI-1d.
SOURCE: 51, 62, 64, 78, 184,

604 BELGIAN BEARDED d'UCCLE BANTAM, PORCELAIN
CHARACT: Same as Brown Red Belgian Bearded d'Uccle Bantam, except PLUMAGE: speckled, beige, see section VI-5f.
SOURCE: 51, 62, 64, 78, 164, 184, 228,

605 BELGIAN BEARDED d'UCCLE BANTAM, RED
CHARACT: Same as Brown Red Belgian Bearded d'Uccle Bantam, except PLUMAGE: all red, see section VI-5g.
SOURCE: 155,

606 BELGIAN BEARDED d'UCCLE BANTAM, WHITE
CHARACT: Same Brown Red Belgian Bearded d'Uccle Bantam, except PLUMAGE: white (c), see sections VI-1j and 5i.
SOURCE: 51, 62, 184,

607 BELGIAN BEARDED d'UCCLE BANTAM, VARIOUS COLORS
CHARACT: Same as Black Belgian Bearded d'Uccle Bantam, except PLUMAGE: various colors.
SOURCE: 71,

608 BOOTED BANTAM, BLACK-TAILED BUFF
CHARACT: EGGS: brown -- SKIN: white (W^+) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: bluish slate (id^+) -- PLUMAGE: buff, "black-tailed" columbian, see section VI-4c OTHER: vulture hocks (*v*), feathered shanks and small body size.
SOURCE: 74,

609 BOOTED BANTAM, BLACK-TAILED RED
CHARACT: Same as Black-tailed Buff Booted Bantam, except PLUMAGE: red, "black-tailed" columbian, see section VI-4c.
SOURCE: 74,

610 BOOTED BANTAM, MILLE FLEUR
CHARACT: Same as Black-tailed Buff Booted Bantam, except PLUMAGE: speckled, golden buff, see section Vi-5f.
SOURCE: 10, 74, 209, 211,

611 BOOTED BANTAM, PARTRIDGE
CHARACT: Same as Black-tailed Buff Booted Bantam, except PLUMAGE: partridge, see section VI-5c.
SOURCE: 74,

612 BOOTED BANTAM, WHITE
CHARACT: Same as Black-tailed Buff Booted Bantam, except PLUMAGE: white (*c*), see section VI-1j, 4f, 5i, and 7e.
SOURCE: 212,

613 BRAHMA, BUFF
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: pea (*P*) -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: columbian, gold color phase, see section VI-5d -- OTHER: feathered shanks.
SOURCE: 4, 54, 99, 127, 141, 164, 167, 172, 193, 223, 228, 258,

614 BRAHMA BANTAM, BUFF
CHARACT: Same as Buff Bantam, except smaller body.
SOURCE: 88, 122, 127, 167, 172, 178, 211, 223, 228, 233, 258,

615 BRAHMA, DARK
CHARACT: Same as Buff Brahma, except PLUMAGE: penciled, see section VI-5c.
SOURCE: 4, 41, 54, 71, 125, 127, 141, 148, 164, 167, 172, 193, 210, 228, 258,

616 BRAHMA BANTAM, DARK
CHARACT: Same as Dark Brahma, except smaller body.
SOURCE: 127, 164, 167, 172, 223, 228, 233, 258,

617 BRAHMA, LIGHT
CHARACT: Same as Buff Brahma, except PLUMAGE: columbian, see section VI-5d.
SOURCE: 4, 14, 41, 54, 55, 71, 74, 125, 127, 141, 148, 164, 167, 172, 193, 210, 228, 258,

618 BRAHMA BANTAM, LIGHT
CHARACT: Same as Light Brahma, except smaller body.
SOURCE: 4, 127, 158, 167, 172, 184, 197, 210, 211, 223, 228, 233, 258,

619 BRAHMA, WHITE
CHARACT: Same as Buff Brahma, except PLUMAGE: white (*I*), see section VI-5i.
SOURCE: 74,

620 BRASILIAN MUSICAL FOWL (SINGER or CROWER)
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: spangled black breasted red, see section VI-3g -- OTHER: long crowing of about 10 seconds.
SOURCE: 4,

621 BRESSE
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: single -- EYES: brown (*br*) -- EARLOBES: white -- SHANKS: slaty blue (id^+) -- PLUMAGE: various colors.
SOURCE: 241,

622 BUCKEYE
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: pea (*P*) -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: mahogany bay "black-tailed" columbian, see section VI-7c.
SOURCE: 167, 231,

623 BUCKEYE BANTAM
CHARACT: Same as Buckeye, except smaller body.
SOURCE: 167, 213, 231,

624 BURMESE BANTAM, BLACK
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: slate (id^+) -- PLUMAGE: black, see section VI-1 -- OTHER: crest (*Cr*), vulture hocks (*v*), feathered shanks.
SOURCE: 74,

625 BURMESE BANTAM, PARTRIDGE
CHARACT: Same as Black Burmese Bantam, except PLUMAGE; partridge, see section VI-5c.
SOURCE: 74,

626 BURMESE BANTAM, SPECKLED
CHARACT: Same as Black Burmese Bantam, except PLUMAGE; speckled, see section VI-7c.
SOURCE: 74,

627 BUTTERCUP, SICILIAN
CHARACT: EGGS: white -- SKIN: yellow (*w*) -- COMB: duplex (D^B) -- EYES: reddish bay -- EARLOBES: white -- SHANKS: willow-green (id^+) -- PLUMAGE: buttercup, see section VI-6.
SOURCE: 4, 51, 71, 127, 164, 172, 211, 228, 232, 258,

628 BUTTERCUP, SILVER SICILIAN
CHARACT: Same as Sicilian Buttercup, except PLUMAGE: silver color phase of the buttercup pattern, see section VI-6a.
SOURCE: 51,

629 CALIFORNIA WHITE
CHARACT: EGGS: white -- SKIN: yellow (*w*) -- COMB: single -- EYES: reddish bay -- EARLOBES: white -- SHANKS: yellow (*Id*) -- PLUMAGE: white, see section VI-1j.
SOURCE: 164,

630 CAMPINE, GOLDEN
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: single -- EYES: brown (*br*) -- EARLOBES: white -- SHANKS: leaden blue (id^+) -- PLUMAGE: golden autosomal barred, see section VI-5b -- OTHER: males henny feathered (*Hf*)
SOURCE: 127, 164, 167, 228, 244, 245, 258,

631 CAMPINE BANTAM, GOLDEN
CHARACT: Same as Golden Campine, except smaller body.
SOURCE: 245,

632 CAMPINE, SILVER
CHARACT: Same as Golden Campine, except PLUMAGE: silver autosomal barred, see section VI-5b.
SOURCE: 164, 167, 228, 244, 245, 258,

633 CAMBAR
CHARACT: EGGS: tinted -- SKIN: white (W^+) -- COMB: single -- EYES: reddish bay -- EARLOBES: white -- SHANKS: white (*Id*) -- PLUMAGE: grey and gold barred, except head, neck and saddle hackles which are gold. A silver variety is the same as the gold, except "silver" where above reads "gold." This is an autosexing breed. *Female* down is mottled chocolate brown with mottling sharply defined and a light head patch. *Male* down much paler, washed out blurred pattern without a head patch (*B*).
SOURCE: 52,

634 CATALANA DEL PRAT LEONADA, BUFF
CHARACT: EGGS: tinted -- SKIN: white (W^+) -- COMB: single -- EYES: reddish bay -- EARLOBES: white -- SHANKS: slate (id^+) -- PLUMAGE: buff "black-tailed" eolumbian, see section VI-4c.
SOURCE: 4, 42, 43, 44, 222,

635 CATALANA DEL PRAT LEONADA, WHITE
CHARACT: Same as Buff Catalana del Prat Leonada, except PLUMAGE: recessive white (*c*).
SOURCE: 43,

636 CATALANA EMPORDANESA (Heterogenic population)
CHARACT: EGGS: dark brown -- SKIN: white (W^+) -- COMB: single with two appendix on the posterior end -- EYES: variability -- EARLOBES: red to white -- SHANKS: yellow (*Id*) -- PLUMAGE: probably it carries e^{Wh}, e^b, *Co*, *c*, *Bl*, *Pg*, s^+ and others.
SOURCE: 42,

637 CATALANA PENEDESENCA (Heterogenic population)
CHARACT: EGGS: dark brown -- SKIN: white (W^+) -- COMB: single with two appendix on the posterior end -- EYES: variable -- EARLOBES: predominantly white -- SHANKS: slate (id^+) -- PLUMAGE: probably it carries *E*, e^{Wh}, e^b, *Co*, *Pg*, *Sp*, *S*, s^+, *B* and others.
SOURCE: 42,

638 CHANTECLER, BUFF
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: walnut (*R*, *P*) -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: all buff, see sections VI 4e and 7d.
SOURCE: 225, 226,

639 CHANTECLER BANTAM, BUFF
CHARACT: Same as Buff Chantecler, except smaller body.
SOURCE: 226,

640 CHANTECLER, PARTRIDGE
CHARACT: Same as Buff Chantecler, except PLUMAGE: partridge, see section VI-5c.
SOURCE: 226, 231, 232,

641 CHANTECLER BANTAM, PARTRIDGE
CHARACT: Same as Partridge Chantecler, except smaller body size.
SOURCE: 226,

642 CHANTECLER, WHITE
CHARACT: Same as Buff Chantecler, except PLUMAGE: white (*c*), see section VI-5i.
SOURCE: 10, 226,

643 CHANTECLER BANTAM, WHITE
CHARACT: Same as White Chantecler, except smaller body.
SOURCE: 226,

644 COCHIN, BARRED
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: sex-linked barred, see section VI-1e -- OTHER: feathered shanks.
SOURCE: 228,

645 COCHIN BANTAM, BARRED
CHARACT: Same as Barred Cochin, except smaller body.
SOURCE: 4, 127, 164, 172, 228, 234, 258,

646 COCHIN, BIRCHEN
CHARACT: Same as Barred Cochin, except PLUMAGE: birchen, see section VI-2.
SOURCE: 230,

647 COCHIN BANTAM, BIRCHEN
CHARACT: Same as Birchen Cochin, except smaller body.
SOURCE: 127, 141, 172, 229, 230, 253,

648 COCHIN, BLACK
CHARACT: Same as Barred Cochin, except PLUMAGE: black, see section VI-1.
SOURCE: 4, 179, 127, 141, 148, 158, 164, 210, 228, 230, 234, 257, 258,

649 COCHIN, BLACK FRIZZLE
CHARACT: Same as Black Cochin, except OTHER: frizzled or curled feathers (*F*).
SOURCE: 228,

650 COCHIN BANTAM, BLACK
CHARACT: Same as Black Cochin, except smaller body.
SOURCE: 41, 71, 87, 90, 117, 126, 179, 140, 141, 155, 158, 164, 172, 175, 176, 180, 183, 202, 210, 228, 229, 230, 234, 252, 257, 258, 260,

651 COCHIN BANTAM, BLACK FRIZZLE
CHARACT: Same as Black Cochin Bantam, except OTHER: frizzled or curled feathers (*F*).
SOURCE: 155, 176, 228,

652 COCHIN, BLUE
CHARACT: Same as Barred Cochin, except PLUMAGE: blue, see section VI-1b.
SOURCE: 125, 127, 141, 148, 166, 196, 228,

653 COCHIN BANTAM, BLUE
CHARACT: Same as Blue Cochin, except smaller body.
SOURCE: 90, 126, 127, 141, 172, 176, 183, 228, 229, 230, 258,

654 COCHIN BANTAM, BLUE FRIZZLE
CHARACT: Same as Blue Cochin Bantam, except OTHER: frizzled or curled feathers (*F*)
SOURCE: 176,

655 COCHIN, BROWN
CHARACT: Same as Barred Cochin, except PLUMAGE: No description of this color variety given.
SOURCE: 228, 230,

656 COCHIN BANTAM, BROWN
CHARACT: Same as Brown Cochin, except smaller body.
SOURCE: 228,

657 COCHIN, BROWN RED
CHARACT: Same as Barred Cochin, except PLUMAGE: gold color phase of birchen, see section VI-2a.
SOURCE: 228, 230,

658 COCHIN, BUFF
CHARACT: Same as Barred Cochin, except PLUMAGE: all buff, see section VI-4d and 7d.
SOURCE: 4, 71, 78, 87, 90, 109, 127, 141, 148, 158, 164, 167, 180, 201, 202, 210, 228, 230, 234, 258,

659 COCHIN BANTAM, BUFF
CHARACT: Same as Buff Cochin, except smaller body.
SOURCE: 109, 117, 127, 164, 172, 176, 180, 202, 228, 229, 230, 234, 258, 260,

660 COCHIN BANTAM, BUFF FRIZZLE
CHARACT: Same as Buff Cochin Bantam, except OTHER: frizzled or curled feathers (*F*).
SOURCE: 176,

661 COCHIN BANTAM, BUFF COLUMBIAN
CHARACT: Same as Barred Cochin Bantam, except PLUMAGE: columbian, gold color phase, see section VI-5d.
SOURCE: 258,

662 COCHIN BANTAM, COLUMBIAN
CHARACT: Same as Barred Cochin Bantam, except PLUMAGE: columbian, see section VI-5d.
SOURCE: 258,

663 COCHIN BANTAM, CUCKOO
CHARACT: Same as Barred Cochin Bantam, except PLUMAGE: slightly modified sex-linked barred, see section VI-1e.
SOURCE: 71,

664 COCHIN, GOLDEN LACED
CHARACT: Same as Barred Cochin, except PLUMAGE: golden, laced with black, see section VI-5e.
SOURCE: 172, 228,

665 COCHIN BANTAM, GOLDEN LACED
CHARACT: Same as Golden Laced Cochin, except smaller body.
SOURCE: 258,

666 COCHIN BANTAM, LAVENDER
CHARACT: Same as Barred Cochin Bantam, except PLUMAGE: light slaty blue, see section VI-1a.
SOURCE: 71,

667 COCHIN BANTAM, MOTTLED
CHARACT: Same as Barred Cochin Bantam, except PLUMAGE: mottled, black with a small white tip, see section VI-1d.
SOURCE: 71, 127, 141, 164, 167, 172, 228, 230, 258,

668 COCHIN, PARTRIDGE
CHARACT: Same as Barred Cochin, except PLUMAGE: partridge, see section VI-5c.
SOURCE: 4, 71, 127, 148, 164, 167, 227, 228, 258,

669 COCHIN BANTAM, PARTRIDGE
CHARACT: Same as Partridge Cochin, except smaller body.
SOURCE: 71, 127, 164, 172, 258,

670 COCHIN, RED
CHARACT: Same as Barred Cochin, except PLUMAGE: all brilliant red, see section VI-5g.
SOURCE: 228,

671 COCHIN BANTAM, RED
CHARACT: Same as Red Cochin, except smaller body.
SOURCE: 71, 127, 172, 175, 228, 234, 258,

672 COCHIN, SILVER LACED
CHARACT: Same as Barred Cochin, except PLUMAGE: silver laced, see section VI-5e.
SOURCE: 125, 148, 166, 228, 230,

673 COCHIN, SPLASH
CHARACT: Same as Barred Cochin, except PLUMAGE: splash, white with large irregular blobs of blue, see section VI-1e.
SOURCE: 141,

674 COCHIN BANTAM, SPLASH
CHARACT: Same as Splash Cochin, except smaller body.
SOURCE: 141, 176, 183,

675 COCHIN BANTAM, SPLASH FRIZZLE
CHARACT: Same as Splash Cochin Bantam, except OTHER: frizzled or curled feathers (*F*)
SOURCE: 176,

676 COCHIN, WHITE
CHARACT: Same as Barred Cochin, except PLUMAGE: white (*c*), see section VI-1j, 2e, 4e, 5i, and 7e.
SOURCE: 4, 179, 127, 141, 148, 164, 167, 196, 210, 228, 230, 257, 258,

677 COCHIN BANTAM, WHITE
CHARACT: Same as White Cochin, except smaller body.
SOURCE: 87, 90, 95, 117, 127, 140, 141, 164, 166, 172, 175, 176, 202, 210, 225, 228, 230, 233, 234, 252, 257, 258,

678 COCHIN BANTAM, WHITE FRIZZLE
CHARACT: Same as White Cochin Bantam, except OTHER: frizzled or curled feathers (*F*).
SOURCE: 176, 228, 233,

679 COCHIN, VARIOUS COLORS
CHARACT: Same as Barred Cochin, except PLUMAGE: various colors.
SOURCE: 60,

680 CORNISH BANTAM, BLACK
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: pea (*P*) -- EYES: pearl -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: black, see section VI-1 -- OTHER: small body size.
SOURCE: 155, 184,

681 CORNISH, BUFF
CHARACT: Same as Black Cornish Bantam, except PLUMAGE: all buff, see section VI-4e and 7d -- OTHER: standard body size.
SOURCE: 172, 177, 231,

682 CORNISH BANTAM, BUFF
CHARACT: Same as Buff Cornish, except smaller body.
SOURCE: 177, 184,

683 CORNISH BANTAM, BLUE LACED RED
CHARACT: Same as Black Cornish Bantam, except PLUMAGE: dark red, each feather laced with blue, see section VI-7a.
SOURCE: 184,

684 CORNISH, DARK
CHARACT: Same as Buff Cornish, except PLUMAGE: reddish mahogany, dark double laced, see section VI-7b.
SOURCE: 4, 84, 101, 126, 127, 148, 164, 172, 184, 200, 212, 231, 236, 258,

685 CORNISH BANTAM, DARK
CHARACT: Same as Dark Cornish, except smaller body.
SOURCE: 71, 84, 90, 95, 126, 127, 158, 173, 210, 231, 250, 258, 260,

686 CORNISH, JUBILEE
CHARACT: Same as Buff Cornish, except PLUMAGE: reddish mahogany, white double laced, see section VI-7b.
SOURCE: 184,

687 CORNISH BANTAM, MOTTLED
CHARACT: Same as Black Cornish Bantam, except PLUMAGE: mottled, black with a small white tip, see section VI-1d.
SOURCE: 184,

688 CORNISH, RED
CHARACT: Same as Buff Cornish, except PLUMAGE: all red, see section VI-5g.
SOURCE: 11,

689 CORNISH, WHITE
CHARACT: Same as Buff Cornish, except PLUMAGE: white (*c*), see section IV-1j, 4f, and 7e.
SOURCE: 41, 108, 125, 126, 148, 172, 182, 225, 228, 231, 236, 258,

690 CORNISH BANTAM, WHITE
CHARACT: Same as White Cornish, except smaller body.
SOURCE: 41, 84, 107, 126, 140, 143, 164, 184, 211, 212, 258,

691 CORNISH, WHITE-LACED RED
CHARACT: Same as Buff Cornish, except PLUMAGE: dark red, each feather laced with white, see section VI-7a.
SOURCE: 4, 126, 127, 134, 148, 164, 172, 177, 193, 225, 228, 231, 258,

692 CORNISH BANTAM, WHITE-LACED RED
CHARACT: Same as White-Laced Red Cornish, except smaller body size.
SOURCE: 95, 126, 164, 167, 177, 202, 211, 212, 225, 258,

693 CREVECOEUR, BLACK
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: duplex (D^P) -- EYES: reddish bay -- EARLOBES: red -- SHANKS: leaden blue (id^+) -- PLUMAGE: black, see section VI-1 -- OTHER: crest (*Cr*) and muffs and beard (*Mb*).
SOURCE: 49, 71, 127, 155, 164, 167, 175, 221, 225, 228, 258,

694 CREVECOEUR BANTAM, BLACK
CHARACT: Same as Black Crevecoeur, except smaller body.
SOURCE: 261,

695 CUBALAYA, BLACK
CHARACT: EGGS: brown -- SKIN: white (W^+) --COMB: pea (*P*) -- EYES: reddish bay -- EARLOBES: red -- SHANKS: slate (*Id*) -- PLUMAGE: black, see section VI-1 -- OTHER: tail droops below the horizontal.
SOURCE: 155,

696 CUBALAYA, BLACK BREASTED RED
CHARACT: Same as Black Cubalaya, except SHANKS: white (*Id*) -- PLUMAGE: dark black breasted red, see section VI-7.
SOURCE: 161, 164, 167, 185, 225,

697 CUBALAYA BANTAM, BLACK BREASTED RED
CHARACT: Same as Black Breasted Red Cubalaya, except smaller body size.
SOURCE: 228,

698 CUBALAYA, GOLDEN DUCKWING
CHARACT: Same as Black Breasted Red Cubalaya, except PLUMAGE: silver color phase of black breasted red, see section VI-3c.
SOURCE: 185,

699 CUBALAYA, VARIOUS COLORS
CHARACT: Same as Black Cubalaya, except PLUMAGE: various colors.
SOURCE: 224,

700 DELAWARE
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: sex-linked barred, see section VI-5d.
SOURCE: 133, 169, 231,

701 DELAWARE BANTAM
CHARACT: Same as Delaware, except smaller body.
SOURCE: 95, 184, 222,

702 DOMINIQUE
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: rose (*R*) -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: sex-linked barred, see section VI-1e.
SOURCE: 4, 71, 112, 127, 164, 166, 167, 172, 193, 228, 237, 239, 254, 258,

703 DOMINIQUE BANTAM
CHARACT: Same as Dominique, except smaller body.
SOURCE: 164, 221, 228,

704 DORKING, DARK (COLORED or DUNKLE DORKING)
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: either single or rose comb (*R*) -- EYES: red -- EARLOBES: red -- SHANKS: white (*Id*) -- PLUMAGE: dark gray, see section VI-3d.
SOURCE: 61, 71, 124, 231,

705 DORKING, SINGLE COMB RED
CHARACT: Same as Single Comb Dark Dorking, except PLUMAGE: black breasted red, see section VI-3.
SOURCE: 71,

706 DORKING BANTAM, SINGLE COMB RED
CHARACT: Same as Single Comb Red Dorking, except smaller body size
SOURCE: 124,

707 DORKING, SINGLE COMB SILVER GRAY
CHARACT: Same as Dark Dorking, except COMB: single -- PLUMAGE: silver color phase of black breasted red pattern, see section VI-3c.
SOURCE: 55, 60, 71, 78, 80, 124, 127, 164, 167, 225, 228, 258,

708 DORKING BANTAM, SINGLE COMB SILVER GRAY
CHARACT: Same as Silver Gray Dorking, except smaller body.
SOURCE: 183, 258,

709 DORKING, ROSE COMB WHITE
CHARACT: Same as Dark Dorking, except COMB: rose (*R*) -- PLUMAGE: white (*c*), see section VI-1j, 2e, 3i, and 5i.
SOURCE: 124, 164, 231,

710 DORKING BANTAM, ROSE COMB WHITE
CHARACT: Same as White Rose Comb Dorking, except smaller body size.
SOURCE: 124,

711 DORKING, VARIOUS COLORS
CHARACT: Same as Dark Dorking, except PLUMAGE: various colors.
SOURCE: 204,

712 DUTCH BANTAM, BLACK
CHARACT: EGGS: white -- (W^+) -- COMB: single -- EYES: brown (*br*) -- EARLOBES: white -- SHANKS: slaty blue (id^+) -- PLUMAGE: black, see section VI-1.
SOURCE: 241,

713 DUTCH BANTAM, BLACK BREASTED RED
CHARACT: Same as Black Dutch Bantam, except EYES: reddish bay -- PLUMAGE: black breasted red, see section VI-3.
SOURCE: 51, 175, 184, 241,

714 DUTCH BANTAM, BLUE
CHARACT: Same as Black Dutch Bantam, except EYES: reddish brown -- PLUMAGE: blue, see section VI-1b.
SOURCE: 241,

715 DUTCH BANTAM, BLUE RED
CHARACT: Same as Black Breasted Red Dutch Bantam, except PLUMAGE: blue color phase of black breasted red, see section VI-3e.
SOURCE: 51, 175, 184,

716 DUTCH BANTAM, BLUE WHEATEN
CHARACT: Same as Black Breasted Red Dutch Bantam, except PLUMAGE: blue color phase of wheaten, see section VI-4b.
SOURCE: 241,

717 DUTCH BANTAM, BROWN RED
CHARACT: Same as Black Dutch Bantam, except PLUMAGE: gold color phase of birchen, see section VI-2a.
SOURCE: 175,

718 DUTCH BANTAM, GOLDEN
CHARACT: Same as Black Breasted Red Dutch Bantam, except PLUMAGE: silver color phase of black breasted red, see section VI-3c.
SOURCE: 51, 71, 175, 241,

719 DUTCH BANTAM, GOLD PARTRIDGE
CHARACT: Same as Black Breasted Red Dutch Bantam except PLUMAGE: partridge, see section VI-5c.
SOURCE: 50,

720 DUTCH BANTAM, SILVER
CHARACT: Same as Black Breasted Red Dutch Bantam, except PLUMAGE: silver color phase of black breasted red, see section VI-3c.
SOURCE: 71, 175, 241,

721 DUTCH BANTAM, WHEATEN
CHARACT: Same as Black Breasted Red Dutch Bantam, except PLUMAGE: wheaten, see section VI-4a.
SOURCE: 241,

722 DUTCH BANTAM, WHITE
CHARACT: Same as Black Breasted Red Dutch Bantam, except PLUMAGE: white (*c*), see section VI-1j, 4f, 5i and 7e.
SOURCE: 51,

723 EUSKO-OLLOA, BLACK
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: black, see section VI-1.
SOURCE: 43,

724 EUSKO-OLLOA, COLUMBIAN
CHARACT: Same as Black Eusko-Olloa, except PLUMAGE: black-tailed white; see section VI-4c.
SOURCE: 43,

725 EUSKO-OLLOA, RED
CHARACT: Same as Black Eusko-Olloa, except PLUMAGE: orange red in males, red brown in females; "black-tailed columbian," see section VI-4c.
SOURCE: 43,

726 EUSKO-OLLOA, RED BARRED
CHARACT: Same as Black Eusko-Olloa, except PLUMAGE: sex-linked barred, see section VI-4d.
SOURCE: 43,

727 FAVEROLLE BANTAM, BIRCHEN
CHARACT: EGGS: tinted -- SKIN: white (W^+) -- COMB: single -- EYES: dark brown -- EARLOBES: red -- SHANKS: black (*Id*) -- PLUMAGE: birchen, see section VI-2 -- OTHER: muffs and beard (*Mb*), five toes (*Po*), feathered shanks, and small body size.
SOURCE: 230,

728 FAVEROLLE, BLACK
CHARACT: Same as Birchen Faverolle Bantam, except PLUMAGE: black, see section IV-1 -- OTHER: standard body size.
SOURCE: 49,

729 FAVEROLLE BANTAM, BLACK
CHARACT: Same as Black Faverolle, except smaller body.
SOURCE: 49,

730 FAVEROLLE BANTAM, BLUE
CHARACT: Same as Birchen Faverolle Bantam, except PLUMAGE: blue, see section VI-1b.
SOURCE: 49,

731 FAVEROLLE BANTAM, BUFF
CHARACT: Same as Birchen Faverolle Bantam, except EYES: reddish bay -- SHANKS: white (*Id*) -- PLUMAGE: all buff, see sections VI-4d and 7d.
SOURCE: 49,

732 FAVEROLLE BANTAM, ERMINE
CHARACT: Same as Buff Faverolle Bantam, except PLUMAGE: silver columbian, see section VI-5d.
SOURCE: 49,

733 FAVEROLLE, SALMON
CHARACT: Same as Buff Faverolle Bantam, except PLUMAGE: wheaten, see section VI-4a -- OTHER: standard body size.
SOURCE: 4, 49, 56, 60, 61, 127, 141, 148, 164, 167, 172, 193, 198, 228, 283, 249, 258,

734 FAVEROLLE BANTAM, SALMON
CHARACT: Same as Salmon Faverolle, except smaller body.
SOURCE: 41, 49, 61, 95, 167, 186, 258,

735 FAVEROLLE, WHITE
CHARACT: Same as Salmon Faverolle, except PLUMAGE: white (*c*), see section VI-1j, 4f, 5i, and 7e.
SOURCE: 49, 198,

736 FAVEROLLE BANTAM, WHITE
CHARACT: Same as White Faverolle, except smaller body.
SOURCE: 49, 230,

737 FAYOUMI
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: single -- EYES: brown -- EARLOBES: red -- SHANKS: blue (id^+) -- PLUMAGE: autosomal barred, see section VI-6b.
SOURCE: 20, 24, 71, 123, 127,

738 FRISIAN, VARIOUS COLORS
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: single -- EYES: dark brown red -- EARLOBES: white -- SHANKS: slaty blue (id^+ .) -- PLUMAGE: various colors.
SOURCE: 36,

739 FRIZZLE BANTAM, BARRED
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: sex-linked barred, see section VI-1e -- OTHER: smaller body.
SOURCE: 87,

740 FRIZZLE, BLACK
CHARACT: Same as Barred Frizzle Bantam, except PLUMAGE: black, see section VI-1 -- OTHER: standard body size.
SOURCE: 195,

741 FRIZZLE BANTAM, BLACK
CHARACT: Same as Black Frizzle, except smaller body.
SOURCE: 70, 87,

742 FRIZZLE BANTAM, BLACK FEATHER-LEGGED
CHARACT: Same as Black Frizzle Bantam, except OTHER: feathered shanks.
SOURCE: 258,

743 FRIZZLE, BLUE
CHARACT: Same as Black Frizzle, except PLUMAGE: blue, see section VI-1b.
SOURCE: 195,

744 FRIZZLE, BROWN RED
CHARACT: Same as Black Frizzle, except PLUMAGE: gold color phase of birchen, see section VI-2a.
SOURCE: 74,

745 FRIZZLE BANTAM, LIGHT
CHARACT: Same as Barred Frizzle Bantam, except PLUMAGE: columbian, see section VI-5d.
SOURCE: 4,

746 FRIZZLE, PARTRIDGE
CHARACT: Same as Black Frizzle, except PLUMAGE: partridge, see section VI-5c.
SOURCE: 74,

747 FRIZZLE, RED
CHARACT: Same as Black Frizzle, except PLUMAGE: all red, see section VI-5g.
SOURCE: 74,

748 FRIZZLE, WHITE
CHARACT: Same as Black Frizzle, except, PLUMAGE: white (*c*), see section VI-1j, 2e, 4f, 5i, and 7e.
SOURCE: 195,

749 FRIZZLE BANTAM, WHITE
CHARACT: Same as White Frizzle, except smaller body.
SOURCE: 71, 87, 258,

750 FRIZZLE, WHITE FEATHER-LEGGED
CHARACT: Same as White Frizzle, except OTHER: feathered shanks.
SOURCE: 258,

751 FRIZZLE BANTAM, WHITE FEATHER-LEGGED
CHARACT: Same as White Feather-Legged Frizzle, except smaller body.
SOURCE: 258,

752 FRIZZLE, VARIOUS COLORS
CHARACT: Same as Black Frizzle, except PLUMAGE: various colors.
SOURCE: 41, 232,

753 FRIZZLE BANTAM, VARIOUS COLORS
CHARACT: Same as Various Colors Frizzle, except smaller body.
SOURCE: 41, 161, 164,

754 HAMBURG, BLACK
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: rose (*R*) -- EYES: reddish bay -- EARLOBES: white -- SHANKS: black (id^+) -- PLUMAGE: black, see section VI-1.
SOURCE: 56, 140, 161, 163, 172, 212, 227, 228,

755 HAMBURG, BLUE
CHARACT: Same as Black Hamburg, except SHANKS: leaden blue (id^+) -- PLUMAGE: blue, see section VI-1b.
SOURCE: 163,

756 HAMBURG, BUFF PENCILED
CHARACT: Same as Blue Hamburg, except PLUMAGE: buff autosomal barred, see section VI-6b.
SOURCE: 163,

757 HAMBURG, GOLDEN PENCILED
CHARACT: Same as Blue Hamburg, except PLUMAGE: golden autosomal barred, see section VI-6b.
SOURCE: 96, 127, 140, 163, 164, 212, 228, 239, 240,

758 HAMBURG, GOLDEN SPANGLED
CHARACT: Same as Blue Hamburg, except PLUMAGE: golden, each feather ending with a black spangle, see section VI-1i.
SOURCE: 4, 41, 163, 166, 212, 228, 240, 258,

759 HAMBURG BANTAM, GOLDEN SPANGLED
CHARACT: Same as Golden Spangled Hamburg, except smaller body size.
SOURCE: 41, 212,

760 HAMBURG, SILVER PENCILED
CHARACT: Same as Blue Hamburg, except PLUMAGE: silver autosomal barred, see section VI-6b.
SOURCE: 163, 212, 228, 231, 240,

761 HAMBURG, SILVER SPANGLED
CHARACT: Same as Blue Hamburg, except PLUMAGE: white, each feather ending with a black spangle, see section VI-1i.
SOURCE: 4, 137, 115, 127, 163, 164, 166, 172, 182, 212, 228, 231, 252,

762 HAMBURG BANTAM, SILVER SPANGLED
CHARACT: Same as Silver Spangled Hamburg, except smaller body size.
SOURCE: 54, 140, 166, 212, 240, 258,

763 HAMBURG, WHITE
CHARACT: Same as Blue Hamburg, except PLUMAGE: white (*I*), see section VI-1j, 4f, 5i, 6c, and 7e.
SOURCE: 163, 161, 212, 228,240,

764 HAMBURG BANTAM, WHITE
CHARACT: Same as White Hamburg, except smaller body.
SOURCE: 212,

765 HOUDAN, MOTTLED
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: duplex (D^V) -- EYES: reddish bay -- EARLOBES: white -- SHANKS: white (*Id*) -- PLUMAGE: mottled, black with a small white tip, see section VI-1d -- OTHER: crest (*Cr*), muffs and beard (*Mb*), five toes (*Po*).
SOURCE: 3, 14, 49, 127, 164, 167, 175, 204, 221, 228, 258,

766 HOUDAN BANTAM, MOTTLED
CHARACT: Same as Mottled Houdan, except smaller body.
SOURCE: 4, 221, 258,

767 HUNGARIAN BARRED
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: sex-linked barred, see section VI-1e.
SOURCE: 32,

768 HUNGARIAN WHITE
CHARACT: Same as Hungarian Barred, except PLUMAGE: white (*c*), see sections VI-1j and 4f.
SOURCE: 32,

769 HUNGARIAN YELLOW
CHARACT: Same as Hungarian Barred, except PLUMAGE: golden buff, "black-tailed" columbian, see section VI-4c.
SOURCE: 20, 32,

770 INDIAN GAME, DARK
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: pea (*P*) -- EYES: pearl -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: reddish mahogany, dark double laced, see section VI-7b.
SOURCE: 41, 56, 78,

771 INDIAN GAME BANTAM, DARK
CHARACT: Same as Dark Indian Game, except smaller body.
SOURCE: 41, 56,

772 INDIAN GAME, JUBILEE
CHARACT: Same as Dark Indian Game, except PLUMAGE: reddish mahogany, white double laced, see section VI-7b.
SOURCE: 41, 56, 78,

773 INDIAN GAME BANTAM, JUBILEE
CHARACT: Same as Jubilee Indian Game, except smaller body.
SOURCE: 41,

774 ISLAND FOWL BANTAM, BLACK
CHARACT: no description given of this breed, except PLUMAGE: black, see section VI-1.
SOURCE: 155,

775 JAPANESE BANTAM, BLACK
CHARACT: EGGS: white -- SKIN: yellow (*w*) -- COMB: single -- EYES: brown (*br*) -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: black, see section VI-1 -- OTHER: short legs (*Cp*)
SOURCE: 41, 155, 212, 227, 228, 258,

776 JAPANESE BANTAM, BIRCHEN (GREY)
CHARACT: Same as Black Japanese Bantam, except PLUMAGE: birchen, see section VI-2.
SOURCE: 176, 228, 258,

777 JAPANESE BANTAM, BLACK-TAILED BUFF
CHARACT: Same as Black Japanese Bantam, except EYES: reddish bay -- PLUMAGE: buff, "black-tailed" columbian, see section VI-4c.
SOURCE: 164, 195, 211, 258,

778 JAPANESE BANTAM, BLACK-TAILED WHITE
CHARACT: Same as Black-Tailed Buff Japanese Bantam, except PLUAMGE: white, "black-tailed" columbian, see section VI-4c.
SOURCE: 4, 41, 127, 162, 164, 175, 193, 195, 210, 228, 230, 258, 260,

779 JAPANESE BANTAM, BROWN RED
CHARACT: Same as Black Japanese Bantam, except PLUMAGE: gold color phase of birchen, see section VI-2a.
SOURCE: 162, 260,

780 JAPANESE BANTAM, MOTTLED
CHARACT: Same as Black Japanese Bantam, except PLUMAGE: mottled, black with a small white tip, see section VI-1d.
SOURCE: 164, 193, 250, 258,

781 JAPANESE BANTAM, WHEATEN
CHARACT: Same as Black-Tailed Buff Japanese Bantam, except PLUMAGE: wheaten, see section VI-4.
SOURCE: 162,

782 JAPANESE BANTAM, WHITE
CHARACT: Same as Black-Tailed Buff Japanese Bantam, except PLUMAGE: white (*c*), see section VI-1j, 2e, 3i, 4f, and 5i.
SOURCE: 41, 211, 212, 258,

783 JAPANESE BANTAM, VARIOUS COLORS
CHARACT: Same as Black Japanese Bantam, except PLUMAGE: various colors.
SOURCE: 126,

784 JAVA, MOTTLED
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: black, bottoms of feet yellow (*Id*) -- PLUMAGE: mottled, black with a small white tip, see section VI-1d.
SOURCE: 167,

785 JERSEY GIANT, BLACK
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: single -- EYES: brown (*br*) -- EARLOBES: red -- SHANKS: black, bottoms of feet yellow (*Id*) -- PLUMAGE: black, see section VI-1.
SOURCE: 10, 14, 49, 98, 115, 127, 131, 136, 141, 164, 228, 258,

786 JERSEY GIANT BANTAM, BLACK
CHARACT: Same as Black Jersey Giant, except smaller body.
SOURCE: 221,

787 JERSEY GIANT, BLUE
CHARACT: Same as Black Jersey Giant, except PLUMAGE: blue, see section VI-1b.
SOURCE: 141,

788 JERSEY GIANT, WHITE
CHARACT: Same as Black Jersey Giant, except SHANKS: willow, bottoms of feet yellow (*Id*) -- PLUMAGE: white (*c*), see section VI-1j.
SOURCE: 20, 98, 115, 127, 131, 136, 141, 164, 177, 228, 231, 258,

789 JERSEY GIANT BANTAM, WHITE
CHARACT: Same as White Jersey Giant, except smaller body.
SOURCE: 232,

790 JUNGLEFOWL, BURMESE RED *(Gallus gallus spadiceus)*
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: single -- EYES: reddish bay -- EARLOBES: white -- SHANKS: bluish slate (id^+) -- PLUMAGE: black breasted red plumage, see section VI-3.
SOURCE: 15,

791 JUNGLEFOWL, INDIAN RED *(Gallus gallus murghi)*
CHARACT: Similar to the Burmese Red Junglefowl, a race of *Gallus gallus*.
SOURCE: 238,

792 JUNGLEFOWL, TONKINESE RED *(Gallus gallus jabouillei)*
CHARACT: Similar to the Burmese Red Junglefowl, a race of *Gallus gallus*.
SOURCE: 201,

793 JUNGLEFOWL, RED *(Gallus gallus gallus* or *bankiva)*
CHARACT: Similar to the Burmese Red Junglefowl. Race of *Gallus gallus* not indicated, probably either *gallus* or *bankiva*.
SOURCE: 85, 91, 100, 117, 164, 209, 254,

794 JUNGLEFOWL, SAIPAN
CHARACT: no description given of this breed.
SOURCE: 99,

795 LA FLECHE
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: duplex (D^V) -- EYES: red -- EARLOBES: white -- SHANKS: black -- PLUMAGE: black, see section VI-1.
SOURCE: 49, 71, 167, 231,

796 LAKENVELDER
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: single -- EYES: deep red -- EARLOBES: white -- SHANKS: slate (id^+) -- PLUMAGE: "Lakenvelder" columbian, see section VI-9.
SOURCE: 54, 116, 127, 164, 167, 172, 193, 211, 228, 258,

797 LAKENVELDER BANTAM
CHARACT: Same as Lakenvelder, except smaller body.
SOURCE: 205,

798 LAKENVELDER, GOLDEN
CHARACT: Same as Lakenvelder, except PLUMAGE: golden "Lakenvelder" columbian, see section VI-9a.
SOURCE: 116,

799 LAMONA
CHARACT: EGGS: white -- SKIN: yellow (w) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (Id) -- PLUMAGE: white (c) -- see sections VI-1j, 2e, 3i, 4f, 5i, 6c, and 7e.
SOURCE: 121, 164, 166,

800 LANGSHAN, BLACK
CHARACT: EGGS: brown -- SKIN: white (W^+) -- COMB: single -- EYES: brown (br) -- EARLOBES: red -- SHANKS: bluish black (id^+) -- PLUMAGE: black, see section VI-1 -- OTHER: feathered shanks and high body carriage.
SOURCE: 4, 74, 90, 125, 127, 141, 155, 164, 167, 202, 210, 225, 228, 258,

801 LANGSHAN BANTAM, BLACK
CHARACT: Same as Black Langshan, except smaller body.
SOURCE: 74, 164, 167, 228, 258,

802 LANGSHAN, BLUE
CHARACT: Same as Black Langshan, except PLUMAGE: blue, see section VI-1b.
SOURCE: 141,

803 LANGSHAN, WHITE
CHARACT: Same as Black Langshan, except SHANKS: slaty blue (id^+) -- PLUMAGE: white (c), see section VI-1j.
SOURCE: 4, 107, 127, 141, 164, 167, 195, 228, 258,

804 LANGSHAN BANTAM, WHITE
CHARACT: Same as White Langshan, except smaller body.
SOURCE: 164, 167, 228,

805 LANGSHAN, BLACK CROAD
CHARACT: EGGS: brown -- SKIN: white (W^+) -- COMB: single -- EYES: brown (br) -- EARLOBES: red -- SHANKS: bluish black (id^+) -- PLUMAGE: black, see section VI-1 -- OTHER: feathered shanks.
SOURCE: 49, 71, 74, 77,

806 LANGSHAN BANTAM, BLACK CROAD
CHARACT: Same as Black Croad Langshan, except smaller body.
SOURCE: 49,

807 LANGSHAN, WHITE CROAD
CHARACT: Same as Black Croad Langshan, except PLUMAGE: white (c), see section VI-1j.
SOURCE: 71, 77,

808 LANGSHAN, BLACK GERMAN
CHARACT: EGGS: brown -- SKIN: white (W^+) -- COMB: single -- EYES: brown (br) -- EARLOBES: red -- SHANKS: bluish black (id^+) -- PLUMAGE: black, see section VI-1 -- OTHER: high body carriage.
SOURCE: 51,

809 LANGSHAN BANTAM, BLACK GERMAN
CHARACT: Same as Black German Langshan, except smaller body size.
SOURCE: 51,

810 LANGSHAN, WHITE GERMAN
CHARACT: Same as Black German Langshan, except SHANKS: slaty blue (id^+) -- PLUMAGE: white (c) , see section VI-1j.
SOURCE: 51,

811 LANGSHAN BANTAM, WHITE GERMAN
CHARACT: Same as White German Langshan, except smaller body size.
SOURCE: 51,

812 LEGBAR, GOLDEN
CHARACT: EGGS: white -- SKIN: yellow (w) -- COMB: single -- EYES: reddish bay -- EARLOBES: white -- SHANKS: yellow (Id) -- PLUMAGE: gold-brown with black barring. This is an autosexing breed. Female down is brown stripe type with light head spot. Male down much paler in shade, pattern being blurred and washed out from head to rump.
SOURCE: 41,

813 LEGBAR BANTAM, GOLDEN
CHARACT: Same as Golden Legbar, except smaller in body size.
SOURCE: 41,

814 LEGHORN, BARRED, SINGLE COMB
CHARACT: EGGS: white -- SKIN: yellow (*w*) -- COMB: single -- EYES: reddish bay -- EARLOBES: white -- SHANKS: yellow (*id*) -- PLUMAGE: sex-linked barred, see section VI-1e.
SOURCE: 232,

815 LEGHORN BANTAM, BARRED, SINGLE COMB
CHARACT: Same as Single Comb Leghorn, except smaller body.
SOURCE: 41, 184, 232,

816 LEGHORN, BLACK, SINGLE COMB
CHARACT: Same as Single Comb Barred Leghorn, except PLUMAGE: black, see section VI-1.
SOURCE: 63, 155, 161, 174, 232, 258,

817 LEGHORN BANTAM, BLACK, SINGLE COMB
CHARACT: Same as Single Comb Black Leghorn, except smaller body.
SOURCE: 41, 52, 232, 235,

818 LEGHORN, BLACK, ROSE COMB
CHARACT: Same as Single Comb Black Leghorn, except COMB: rose (*R*).
SOURCE: 232, 262,

819 LEGHORN, BLACK-TAILED RED, SINGLE COMB
CHARACT: Same as Single Comb Barred Leghorn, except PLUMAGE: red "black-tailed" columbian, see section VI-7c.
SOURCE: 202, 232,

820 LEGHORN BANTAM, BLACK-TAILED RED, SINGLE COMB
CHARACT: Same as Single Comb Black-Tailed Red Leghorn, except smaller body.
SOURCE: 232,

821 LEGHORN, BLUE, SINGLE COMB
CHARACT: Same as Single Comb Barred Leghorn, except PLUMAGE: blue, see section VI-1b.
SOURCE: 63,

822 LEGHORN BANTAM, BLUE, SINGLE COMB
CHARACT: Same as Single Comb Blue Leghorn, except smaller body.
SOURCE: 52,

823 LEGHORN, BLUE, ROSE COMB
CHARACT: Same as Black Rose Comb Leghorn, except PLUMAGE: blue, see section VI-1b.
SOURCE: 262,

824 LEGHORN, BUFF, SINGLE COMB
CHARACT: Same as Single Comb Barred Leghorn, except PLUMAGE: buff, see section VI-7d.
SOURCE: 71, 202, 212, 226, 232, 234, 252, 258,

825 LEGHORN BANTAM, BUFF, SINGLE COMB
CHARACT: Same as Single Comb Buff Leghorn, except smaller body size.
SOURCE: 202, 232, 234, 253,

826 LEGHORN, BUFF, ROSE COMB
CHARACT: Same as Single Comb Buff Leghorn, except COMB: rose (*R*).
SOURCE: 99, 232, 253, 258,

827 LEGHORN, COLUMBIAN, SINGLE COMB
CHARACT: Same as Single Comb Barred Leghorn, except PLUMAGE: white columbian, see section VI-5d.
SOURCE: 232,

828 LEGHORN BANTAM, COLUMBIAN, SINGLE COMB
CHARACT: Same as Single Comb Columbian Leghorn, except smaller body size.
SOURCE: 232,

829 LEGHORN BANTAM, CUCKOO, SINGLE COMB
CHARACT: Same as Single Comb Barred Leghorn Bantam, except PLUMAGE: slightly modified sex-linked barred, see section VI-1e.
SOURCE: 52, 66,

830 LEGHORN, DARK BROWN SINGLE COMB
CHARACT: Same as Single Comb Barred Leghorn, except PLUMAGE: dark brown, see section VI-5.
SOURCE: 41, 93, 127, 158, 174, 202, 232, 234, 258,

831 LEGHORN BANTAM, DARK BROWN, SINGLE COMB
CHARACT: Same as Single Comb Dark Brown Leghorn, except smaller body.
SOURCE: 41, 140, 158, 232, 234, 245, 258,

832 LEGHORN, DANISH BROWN, SINGLE COMB
CHARACT: Same as Single Comb Dark Brown Leghorn.
SOURCE: 102, 104,

833 LEGHORN, DARK BROWN, ROSE COMB
CHARACT: Same as Single Comb Dark Brown Leghorn, except COMB: rose (*R*).
SOURCE: 93, 127, 232, 258,

834 LEGHORN, EXCHEQUER, SINGLE COMB
CHARACT: Same as Single Comb Barred Leghorn, except PLUMAGE: pied, a mixure of black and white, some feathers either all black or all white, others a mixture of both colors, see section VI-1f.
SOURCE: 71,

835 LEGHORN, GOLDEN, SINGLE COMB
CHARACT: Same as Single Comb Barred Leghorn, except PLUMAGE: silver color phase of black breasted red, see section VI-3c.
SOURCE: 41,

836 LEGHORN, LIGHT BROWN, SINGLE COMB
CHARACT: Same as Single Comb Barred Leghorn, except PLUMAGE: black breasted red, see section VI-3a.
SOURCE: 14, 20, 48, 78, 158, 161, 164, 174, 210, 232, 234, 252, 258,

837 LEGHORN BANTAM, LIGHT BROWN, SINGLE COMB
CHARACT: Same as Single Comb Light Brown Leghorn, except smaller body.
SOURCE: 52, 109, 140, 158, 164, 197, 199, 232, 234, 245, 258,

838 LEGHORN, LIGHT BROWN, ROSE COMB
CHARACT: Same as Single Comb Light Brown Leghorn, except COMB: rose (*R*).
SOURCE: 158, 164, 210, 232, 258,

839 LEGHORN BANTAM, LIGHT BROWN, ROSE COMB
CHARACT: Same as Rose Comb Light Brown Leghorn, except smaller body size.
SOURCE: 232, 234,

840 LEGHORN, MILLE FLEUR, SINGLE COMB
CHARACT: Same as Single Comb Barred Leghorn, except PLUMAGE: speckled, golden buff, see section VI-5f.
SOURCE: 184,

841 LEGHORN BANTAM, MILLE FLEUR, SINGLE COMB
CHARACT: Same as Single Comb Mille Fleur Leghorn, except smaller body.
SOURCE: 99,

842 LEGHORN, MILLE FLEUR, ROSE COMB
CHARACT: Same as Single Comb Mille Fleur Leghorn, except COMB: rose (*R*).
SOURCE: 99,

843 LEGHORN, RED, SINGLE COMB
CHARACT: Same as Single Comb Barred Leghorn, except PLUMAGE: all red, see section VI-5g.
SOURCE: 127, 161, 202, 210, 211, 225, 232,

844 LEGHORN BANTAM, RED, SINGLE COMB
CHARACT: Same as Single Comb Red Leghorn, except smaller body size.
SOURCE: 232,

845 LEGHORN BANTAM, RED PYLE, SINGLE COMB
CHARACT: Same as Single Comb Barred Leghorn Bantam, except PLUMAGE: pyle black breasted red, see section VI-3f.
SOURCE: 41,

846 LEGHORN, SILVER, SINGLE COMB
CHARACT: Same as Single Comb Barred Leghorn, except PLUMAGE: silver color phase of black breasted red, see section VI-3c.
SOURCE: 41, 127, 164, 211, 232,

847 LEGHORN BANTAM, SILVER, SINGLE COMB
CHARACT: Same as Single Comb Silver Leghorn, except smaller body size.
SOURCE: 41, 52, 232,

848 LEGHORN BANTAM, SILVER DUCKWING, SINGLE COMB
CHARACT: Same as Single Comb Barred Leghorn Bantam, except PLUMAGE: silver color phase of black breasted red, see section VI-3c.
SOURCE: 52,

849 LEGHORN, WHITE, SINGLE COMB
CHARACT: Same as Single Comb Barred Leghorn, except PLUMAGE: white (*I*), see sections VI-1j, 3i, 5i, and 7c.
SOURCE: 5, 12, 20, 41, 43, 47, 48, 63, 80, 81, 85, 89, 91, 93, 106, 108, 127, 139, 164, 172, 187, 202, 210, 232, 252, 255, 258,

850 LEGHORN BANTAM, WHITE, SINGLE COMB
CHARACT: Same as Single Comb White Leghorn, except smaller body size.
SOURCE: 41, 52, 59, 76, 81, 96, 108, 124, 164, 167, 172, 211, 221, 228, 232, 234, 245, 252, 258,

851 LEGHORN, WHITE, ROSE COMB
CHARACT: Same as Single Comb White Leghorn, except COMB: rose (*R*).
SOURCE: 93, 174, 210, 232, 252, 258,

852 LEGHORN BANTAM, WHITE, ROSE COMB
CHARACT: Same as Rose Comb White Leghorn, except smaller body size.
SOURCE: 135, 167, 232,

853 LEGHORN, WHITE, SINGLE COMB DWARF
CHARACT: Same as Single Comb White Leghorn, except smaller body size because of sex-linked dwarf gene (*dw*).
SOURCE: 14, 24,

854 MALAY, DARK BLACK BREASTED RED
CHARACT: EGGS: tinted -- SKIN: yellow (*w*) -- COMB: walnut (*R,P*) -- EYES: pearl -- EARLOBES -- red -- SHANKS: yellow (*id*) -- PLUMAGE: dark black breasted red, see section VI-7.
SOURCE: 41, 70, 107, 120, 155, 167, 185, 204, 228, 242, 258,

855 MALAY BANTAM, DARK BLACK BREASTED RED
CHARACT: Same as Dark Black Breasted Red Malay, except smaller body size.
SOURCE: 70, 164, 185, 258,

856 MALAY, RED PYLE
CHARACT: Same as Dark Black Breasted Red Malay, except PLUMAGE: pyle black breasted red, see section VI-3f.
SOURCE: 185,

857 MALAY BANTAM, RED PYLE
CHARACT: Same as Red Pyle Malay, except smaller body.
SOURCE: 185,

858 MALAY, SPANGLED
CHARACT: Same as Dark Black Breasted Red Malay, except PLUMAGE: spangled black breasted red, see section VI-3g.
SOURCE: 4,

859 MALAY, VARIOUS COLORS
CHARACT: Same as Dark Black Breasted Red Malay, except PLUMAGE: various colors.
SOURCE: 41, 125,

860 MARANS, DARK CUCKOO
CHARACT: EGGS: brown -- SKIN: white (W^+) -- COMB: single -- EYES: red -- EARLOBES: red -- SHANKS: white (*Id*) -- PLUMAGE: sex-linked barred, see section VI-1e.
SOURCE: 8, 60, 71, 153, 241, 254,

861 MARANS BANTAM, DARK CUCKOO
CHARACT: Same as Dark Cuckoo Marans, except smaller body.
SOURCE: 8, 79, 97,

862 MARANS, SILVER CUCKOO
CHARACT: Same as Dark Cuckoo Marans, except PLUMAGE: silver neck hackles.
SOURCE: 8,

863 MARANS, VARIOUS COLORS
CHARACT: Same as Dark Cuckoo Marans, except PLUMAGE: various colors.
SOURCE: 201,

864 MARSH DAISY, BUFF
CHARACT: EGGS: tinted -- SKIN: yellow (*w*) --COMB: rose (*R*) -- EYES: reddish bay -- EARLOBES: white -- SHANKS: willow (id^+) -- PLUMAGE: all buff, see section VI-4e and 7d.
SOURCE: 54,

865 MARSH DAISY, RED WHEATEN
CHARACT: Same as Buff Marsh Daisy, except PLUMAGE: dark chestnut red "black-tailed" columbian, see section VI-4c.
SOURCE: 54,

866 MINORCA, BLACK, SINGLE COMB
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: single -- EYES: brown (*br*) -- EARLOBES: white -- SHANKS: dark slate (id^+) -- PLUMAGE: black, see section VI-1.
SOURCE: 41, 43, 54, 71, 86, 127, 147, 164, 174, 228, 258,

867 MINORCA BANTAM, BLACK, SINGLE COMB
CHARACT: Same as Single Comb Black Minorca, except smaller body size.
SOURCE: 17, 41, 164,

868 MINORCA, BLACK, ROSE COMB
CHARACT: Same as Single Comb Black Minorca, except COMB: rose (*R*).
SOURCE: 147,

869 MINORCA, BUFF, SINGLE COMB
CHARACT: Same as Single Comb Black Minorca, except EYES: reddish bay -- SHANKS: white (*Id*) -- PLUMAGE: all buff, see section VI-7d.
SOURCE: 127, 147, 164, 202, 228,

870 MINORCA, WHITE, SINGLE COMB
CHARACT: Same as Single Comb Buff Minorca, except PLUMAGE: white (*I*), see sections VI-1j and 7e.
SOURCE: 41, 147, 232,

871 MINORCA, WHITE, ROSE COMB
CHARACT: Same as Single Comb White Minorca, except COMB: rose (*R*).
SOURCE: 232,

872 MODERN GAME BANTAM, BIRCHEN
CHARACT: EGGS: cream -- SKIN: white (W^+) -- COMB: single -- EYES: black -- EARLOBES: mulberry -- SHANKS: black -- PLUMAGE: birchen, see section VI-2 -- OTHER: carriage, very erect; shanks, extremely long.
SOURCE: 41, 63, 79, 90, 141, 164, 211, 258,

873 MODERN GAME BANTAM, BLACK
CHARACT: Same as Birchen Modern Game Bantam, except EYES: brown (*br*) -- EARLOBES: red -- PLUMAGE: black, see section VI-1.
SOURCE: 143, 211, 258,

874 MODERN GAME, BLACK BREASTED RED (BLACK RED)
CHARACT: Same as Birchen Modern Game Bantam, except SKIN: yellow (*w*) -- EYES: red -- SHANKS: willow-green (id^+) -- PLUMAGE: black breasted red, see section VI-3 -- OTHER: standard body size.
SOURCE: 250,

875 MODERN GAME BANTAM, BLACK BREASTED RED
CHARACT: Same as Black Breasted Red Modern Game, except smaller body size.
SOURCE: 58, 63, 77, 79, 211, 250, 258, 260,

876 MODERN GAME BANTAM, BLUE
CHARACT: Same as Birchen Modern Game Bantam, except EARLOBES: red -- SHANKS: leaden black (id^+) -- PLUMAGE: blue, see section VI-1b.
SOURCE: 143,

877 MODERN GAME BANTAM, BLUE RED
CHARACT: Same as Black Breasted Red Modern Game Bantam, except PLUMAGE: blue color phase of black breasted red, see section VI-3e.
SOURCE: 77,

878 MODERN GAME, BROWN RED
CHARACT: Same as Birchen Modern Game Bantam, except PLUMAGE: gold color phase of birchen, see section VI-2a -- OTHER: standard body size.
SOURCE: 74,

879 MODERN GAME BANTAM, BROWN RED
CHARACT: Same as Brown Red Modern Game, except smaller body.
SOURCE: 41, 63, 70, 77, 210, 211, 258,

880 MODERN GAME BANTAM, GOLDEN DUCKWING
CHARACT: Same as Black Breasted Red Modern Game Bantam, except PLUMAGE: silver color phase of black breasted red, see section VI-3c.
SOURCE: 77,

881 MODERN GAME BANTAM, RED PYLE
CHARACT: Same as Black Breasted Red Modern Game, except SHANKS: yellow (*Id*) -- PLUMAGE: pyle black breasted red, see section VI-3f.
SOURCE: 41, 77, 211, 250, 258,

882 MODERN GAME BANTAM, SILVER DUCKWING
CHARACT: Same as Black Breasted Red Modern Game, except PLUMAGE: silver color phase of black breasted red, see section VI-3c.
SOURCE: 41, 58, 77, 211, 258,

883 MODERN GAME BANTAM, WHITE
CHARACT: Same as Black Breasted Red Modern Game, except SHANKS: yellow (*Id*) -- PLUMAGE: white (*I*), see section VI-1j, 2e, 3i, and 4f.
SOURCE: 77, 258,

884 NAKED NECK, BLACK (TURKEN)
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: black, see section VI-1 -- OTHER: naked neck (*Na*).
SOURCE: 155, 211,

885 NAKED NECK BANTAM, BLACK
CHARACT: Same as Black Naked Neck, except smaller body.
SOURCE: 51, 155, 259,

886 NAKED NECK BANTAM, BLUE
CHARACT: Same as Black Naked Neck Bantam, except PLUMAGE: blue, see section VI-1b.
SOURCE: 259,

887 NAKED NECK BANTAM, BLUE RED
CHARACT: Same as Black Naked Neck Bantam, except PLUMAGE: blue color phase of black breasted red, see section VI-3e.
SOURCE: 259,

888 NAKED NECK, RED
CHARACT: Same as Black Naked Neck, except PLUMAGE: red "black-tailed" columbian, see sections VI-4c and 7c.
SOURCE: 161, 172, 193, 232,

889 NAKED NECK BANTAM, RED
CHARACT: Same as Red Naked Neck, except smaller body.
SOURCE: 232, 259,

890 NAKED NECK, WHITE
CHARACT: Same as Black Naked Neck, except PLUMAGE: white (*c*), see sections VI-3i, 4f, and 7e.
SOURCE: 172, 211, 232,

891 NAKED NECK BANTAM, WHITE
CHARACT: Same as White Naked Neck, except smaller body.
SOURCE: 232, 259,

892 NAKED NECK, VARIOUS COLORS
CHARACT: Same as Black Naked Neck, except PLUMAGE: various colors.
SOURCE: 87, 115, 127, 134, 164, 167, 172, 211,

893 NAKED NECK BANTAM, VARIOUS COLORS
CHARACT: Same as various colors Naked Neck, except smaller body size.
SOURCE: 172,

894 NANKIN BANTAM
CHARACT: EGGS: brown -- SKIN: white (W^+) -- COMB: rose (*R*) -- EYES: reddish bay -- EARLOBES: red -- SHANKS: bluish slate (id^+) -- PLUMAGE: light chestnut red "black-tailed" columbian, see section VI-4c.
SOURCE: 74,

895 NATAL GAME
CHARACT: EGGS: tinted -- SKIN: yellow (*w*) -- COMB: pea (*P*) -- EYES: pearl -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: various colors.
SOURCE: 41,

896 NEW HAMPSHIRE
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: dark chestnut red "black-tailed" columbian, see section VI-4c.
SOURCE: 12, 14, 20, 41, 71, 91, 98, 106, 127, 139, 164, 169, 172, 255, 258,

897 NEW HAMPSHIRE BANTAM
CHARACT: Same as New Hampshire, except smaller body.
SOURCE: 41, 95, 139, 194, 213, 258,

898 NORTH HOLLAND BLUE
CHARACT: EGGS: tinted -- SKIN: white (W^+) -- COMB: single -- EYES: red -- EARLOBES: red -- SHANKS: white (*Id*) -- PLUMAGE: sex-linked barred, section VI-1e -- OTHER: feathered shanks.
SOURCE: 36, 49, 50, 55, 57, 61, 65, 66, 68, 69, 72, 74, 76,

899 OLD ENGLISH GAME, BIRCHEN
CHARACT: EGGS: brown -- SKIN: white (W^+) -- COMB: single -- EYES: black -- EARLOBES: mulberry -- SHANKS: black -- PLUMAGE: birchen, see section VI-2 -- OTHER: temperament, very aggressive .
SOURCE: 95,

900 OLD ENGLISH GAME, BLACK
CHARACT: Same as Birchen Old English Game, except EYES: brown (*br*) -- PLUMAGE: black, see section VI-1.
SOURCE: 41, 155, 232,

901 OLD ENGLISH GAME BANTAM, BLACK
CHARACT: Same as Black Old English Game, except smaller body.
SOURCE: 41, 58, 70, 140, 146, 220, 257, 258,

902 OLD ENGLISH GAME, BLACK BREASTED RED (BLACK RED)
CHARACT: Same as Birchen Old English Game,except, EYES: reddish bay -- EARLOBES: red -- SHANKS: white (*Id*) -- PLUMAGE: black breasted red, see section VI-3.
SOURCE: 41, 113, 122, 148, 167, 195, 225, 232, 244,

903 OLD ENGLISH GAME BANTAM, BLACK BREASTED RED
CHARACT: Same as Black Breasted Red Old English Game, except smaller body.
SOURCE: 41, 70, 81, 96, 120, 127, 140, 164, 175, 176, 220, 221, 258, 260,

904 OLD ENGLISH GAME BANTAM, BLACK-TAILED BUFF
CHARACT: Same as Black Breasted Red Old English Game Bantam, except SHANKS: leaden blue (id^+) -- PLUMAGE: buff, "black-tailed" columbian, see section VI-4c.
SOURCE: 140, 146, 221,

905 OLD ENGLISH GAME, BLACK-TAILED RED
CHARACT: Same as Black Breasted Red Old English Game, except SHANKS: leaden blue (id^+) -- PLUMAGE: red, "black-tailed" columbian, see section VI-4c.
SOURCE: 146,

906 OLD ENGLISH GAME, BLACK-TAILED WHITE
CHARACT: Same as Black Breasted Red Old English Game, except PLUMAGE: white, "black-tailed" columbian, see section VI-4c.
SOURCE: 146,

907 OLD ENGLISH GAME BANTAM, BLACK-TAILED WHITE
CHARACT: Same as Black-tailed White Old English Game, except smaller body.
SOURCE: 122, 221,

908 OLD ENGLISH GAME, BLUE
CHARACT: Same as Black Old English Game, except EYES: dark bay -- PLUMAGE: blue, see section VI-1b.
SOURCE: 41, 181,

909 OLD ENGLISH GAME BANTAM, BLUE
CHARACT: Same as Blue Old English Game, except smaller body size.
SOURCE: 41, 58, 70, 149, 176,

910 OLD ENGLISH GAME, BLUE RED
CHARACT: Same as Black Breasted Red Old English Game, except PLUMAGE: blue color phase of black breasted red, see section VI-3e.
SOURCE: 181,

911 OLD ENGLISH GAME BANTAM, BLUE RED
CHARACT: Same as Blue Red Old English Game, except smaller body size.
SOURCE: 58, 70, 140,

912 OLD ENGLISH GAME BANTAM, BLUE SILVER DUCKWING
CHARACT: Same as Black Breasted Red Old English Game Bantam, except PLUMAGE: blue color phase of black breasted red, see section VI-3e.
SOURCE: 70,

913 OLD ENGLISH GAME BANTAM, MUFF AND BEARDED BLUE WHEATEN
CHARACT: Same as Black Breasted Red Old English Game Bantam, except PLUMAGE: blue color phase of wheaten, see section VI-4b -- OTHER: muffs and beard (*Mb*).
SOURCE: 173,

914 OLD ENGLISH GAME, BRASSY BACK (FURNESS OR POLECAT)
CHARACT: Same as Black Old English Game, except PLUMAGE: black with brass color on wings or back, females often streaked with grey-brown on breast and wings.
SOURCE: 146,

915 OLD ENGLISH GAME BANTAM, BRASSY BACK
CHARACT: Same as Brassy Back Old English Game, except smaller body size.
SOURCE: 41, 58, 70, 140,

916 OLD ENGLISH GAME BANTAM, BRASSY BLUE
CHARACT: Same as Brassy Back Old English Game Bantam, except PLUMAGE: blue with brass color on wings or back, females often streaked with grey-brown breast and wings.
SOURCE: 58,

917 OLD ENGLISH GAME, BROWN RED
CHARACT: Same as Birchen Old English Game, except PLUMAGE: gold color phase of birchen, see section VI-2a.
SOURCE: 41, 81, 232,

918 OLD ENGLISH GAME BANTAM, BROWN RED
CHARACT: Same as Brown Red Old English Game, except smaller body size.
SOURCE: 41, 213,

919 OLD ENGLISH GAME, CRELE
CHARACT: Same as Black Breasted Red Old English Game, except PLUMAGE: barred black breasted red, see section VI-3h.
SOURCE: 95,

920 OLD ENGLISH GAME BANTAM, CRELE
CHARACT: Same as Crele Old English Game, except smaller body.
SOURCE: 41, 58, 70, 77, 90, 94, 176, 180, 210,

921 OLD ENGLISH BANTAM, CUCKOO
CHARACT: Same as Black Breasted Red Old English Game Bantam, except PLUMAGE: slightly modified sex-linked barred, see section VI-1c.
SOURCE: 58, 70,

922 OLD ENGLISH GAME BANTAM, GINGER RED
CHARACT: Same as Black Breasted Red Old English Game Bantam, except SHANKS: slaty blue (id^+) -- PLUMAGE: ginger red restriction, see sections VI-3b.
SOURCE: 41, 140,

923 OLD ENGLISH GAME BANTAM, GOLDEN DUCKWING
CHARACT: Same as Black Breasted Red Old English Game Bantam, except PLUMAGE: silver color phase of black breasted red, see section VI-3c.
SOURCE: 70, 175,

924 OLD ENGLISH GAME, GRAY
CHARACT: Same as Birchen Old English Game, except PLUMAGE: variation of birchen, see section VI-2c.
SOURCE: 81,

925 OLD ENGLISH GAME BANTAM, GRAY
CHARACT: Same as Gray Old English Game, except smaller body size.
SOURCE: 41, 77,

926 OLD ENGLISH GAME, LEMON BLUE
CHARACT: Same as Birchen Old English Game, except PLUMAGE: lemon color phase of birchen, see section VI-2d.
SOURCE: 232,

927 OLD ENGLISH GAME BANTAM, LEMON BLUE
CHARACT: Same as Lemon Blue Old English Game, except smaller body size.
SOURCE: 58, 176,

928 OLD ENGLISH GAME, MUFF AND BEARDED
CHARACT: Same as other Old English Games, except PLUMAGE: various colors -- OTHER: muffs and beard (*Mb*).
SOURCE: 41,

929 OLD ENGLISH GAME BANTAM, MUFF AND BEARDED
CHARACT: Same as Muff and Bearded Old English Game, except smaller body.
SOURCE: 41, 70,

930 OLD ENGLISH GAME BANTAM, PARTRIDGE
CHARACT: Same as Black Breasted Red Old English Game Bantam, except PLUMAGE: partridge, see section VI-5c.
SOURCE: 41, 70, 79,

931 OLD ENGLISH GAME, QUAIL
CHARACT: Same as Black Breasted Red Old English Game, except EYES: brown -- PLUMAGE: quail, see section VI-8.
SOURCE: 146,

932 OLD ENGLISH GAME, RED PYLE
CHARACT: Same as Black Breasted Red Old English Game, except PLUMAGE: pyle black breasted red, see section VI-3f.
SOURCE: 95, 181, 244,

933 OLD ENGLISH GAME BANTAM, RED PYLE
CHARACT: Same as Red Pyle Old English Game, except smaller body size.
SOURCE: 41, 70, 77, 96, 151, 211, 230, 258,

934 OLD ENGLISH GAME BANTAM, SELF BLUE
CHARACT: Same as Black Old English Game Bantam, except SHANKS: bluish slate (id^+) -- PLUMAGE: light slaty blue, see section VI-1a.
SOURCE: 146,

935 OLD ENGLISH GAME, SILVER DUCKWING
CHARACT: Same as Black Breasted Red Old English Game, except PLUMAGE: silver color phase of black breasted red, see section VI-3c.
SOURCE: 41, 167,

936 OLD ENGLISH GAME BANTAM, SILVER DUCKWING
CHARACT: Same as Silver Duckwing Old English Game, except smaller body.
SOURCE: 41, 70, 127, 164, 175, 210, 211, 221, 258,

937 OLD ENGLISH GAME, SPANGLED
CHARACT: Same as Black Breasted Red Old English Game, except PLUMAGE: spangled black breasted red, see section VI-3g.
SOURCE: 41, 167, 181, 221, 232, 244,

938 OLD ENGLISH GAME BANTAM, SPANGLED
CHARACT: Same as Spangled Old English Game, except smaller body size.
SOURCE: 70, 80, 95, 167, 210, 211, 258,

939 OLD ENGLISH GAME BANTAM, SPLASH
CHARACT: Same as Black Old English Game Bantam, except PLUMAGE: splash, white with large irregular blobs of blue, see section VI-1c.
SOURCE: 70, 149, 176,

940 OLD ENGLISH GAME, WHEATEN
CHARACT: Same as Black Breasted Red Old English Game, except PLUMAGE: wheaten, see section VI-4.
SOURCE: 41,

941 OLD ENGLISH GAME BANTAM, WHEATEN
CHARACT: Same as Wheaten Old English Game, except smaller body size.
SOURCE: 41, 58, 70, 81, 140, 146, 173,

942 OLD ENGLISH GAME BANTAM, MUFF AND BEARDED WHEATEN
CHARACT: Same as Wheaten Old English Game Bantam, except OTHER: muffs and beard (*Mb*).
SOURCE: 173,

943 OLD ENGLISH GAME, WHITE
CHARACT: Same as Black Breasted Red Old English Game, except PLUMAGE: white (*c*), see sections VI-1j, 2e, 3i, and 4f.
SOURCE: 41, 232,

944 OLD ENGLISH GAME BANTAM, WHITE
CHARACT: Same as White Old English Game, except smaller body size.
SOURCE: 41, 70, 140, 230,

945 OLD ENGLISH GAME BANTAM, VARIOUS COLORS
CHARACT: Same as Black Breasted Red Old English Game Bantam, except PLUMAGE: various colors.
SOURCE: 75, 126,

946 OLD ENGLISH PHEASANT FOWL, GOLDEN SPANGLED
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: rose (*R*) -- EYES: red -- EARLOBES: white -- SHANKS: slate blue (id^+) -- PLUMAGE: spangled; female, rich bay with crescent-shaped spangle, male rich mahogany red with laced breast. Tails black and hackles black striped.
SOURCE: 56, 71,

947 ORLOFF, MAHOGANY
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: walnut (*R,P*) -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: mahogany, "black-tailed" columbian, see section VI-7c.
SOURCE: 204, 231,

948 ORLOFF, SPANGLED
CHARACT: Same as Mahogany Orloff, except PLUMAGE: spangled black breasted red, see section VI-3g.
SOURCE: 164, 231,

949 ORLOFF BANTAM, SPANGLED
CHARACT: Same as Spangled Orloff, except smaller body.
SOURCE: 51, 185, 204,

950 ORPINGTON, BLACK
CHARACT: EGGS: brown -- SKIN: white (W^+) -- COMB: single -- EYES: brown (*br*) -- EARLOBES: red -- SHANKS: black, bottom of feet white (*Id*) -- PLUMAGE: black, see section VI-1.
SOURCE: 71, 73, 80, 129, 258, 262,

951 ORPINGTON BANTAM, BLACK
CHARACT: Same as Black Orpington, except smaller body.
SOURCE: 41, 53, 73, 80, 212, 258,

952 ORPINGTON, BLUE
CHARACT: Same as Black Orpington, except SHANKS: leaden blue (*Id*) -- PLUMAGE: blue, see section VI-1b.
SOURCE: 129, 228, 262,

953 ORPINGTON BANTAM, BLUE
CHARACT: Same as Blue Orpington, except smaller body.
SOURCE: 41, 73,

954 ORPINGTON, BUFF
CHARACT: Same as Black Orpington, except EYES: reddish bay -- SHANKS: white (*Id*) -- PLUMAGE: all buff, see sections VI-4e, and 7d.
SOURCE: 4, 41, 59, 67, 71, 77, 88, 127, 129, 158, 164, 200, 202, 210, 228, 258,

955 ORPINGTON BANTAM, BUFF
CHARACT: Same as Buff Orpington, except smaller body.
SOURCE: 41, 129, 164, 202, 212, 258,

956 ORPINGTON, WHITE
CHARACT: Same as Buff Orpington, except PLUMAGE: white (*c*), see section VI-1j, 4f, and 7e.
SOURCE: 127, 129, 164, 228, 258,

957 ORPINGTON, BANTAM, WHITE
CHARACT: Same as White Orpington, except smaller body.
SOURCE: 221, 258,

958 PARDO DE LEON
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: dark slate (Id^+) -- PLUMAGE: birchen, see section VI-2.
SOURCE: 43,

959 PHOENIX, SILVER (ONAGADORI)
CHARACT: EGGS: white -- SKIN: yellow (*w*) -- COMB: single -- EYES: reddish bay -- EARLOBES: white -- SHANKS: willow (Id^+) -- PLUMAGE: silver color phase of black breasted red, see section VI-3c -- OTHER: male develops extremely long saddle, sickle, lesser sickle and tail covert feathers (*Gi, mi*)
SOURCE: 164,

960 PHOENIX BANTAM, SILVER
CHARACT: Same as Silver Phoenix, except smaller body.
SOURCE: 140,

961 PHOENIX, WHITE
CHARACT: Same as Silver Phoenix, except PLUMAGE: white (*c*), see section VI-3i.
SOURCE: 225,

962 PHOENIX, VARIOUS COLORS
CHARACT: Same as Silver Phoenix, except PLUMAGE: various colors.
SOURCE: 224,

963 PHOENIX BANTAM, VARIOUS COLORS
CHARACT: Same as Various Colors Phoenix, except smaller body size.
SOURCE: 224,

964 PIT GAME, VARIOUS COLORS
CHARACT: No description given.
SOURCE: 257,

965 PLYMOUTH ROCK, BARRED
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: sex-linked barred, see section VI-1e.
SOURCE: 4, 14, 17, 20, 41, 53, 76, 86, 90, 106, 108, 137, 127, 145, 156, 158, 164, 169, 172, 193, 200, 202, 210, 214, 218, 221, 258,

966 PLYMOUTH ROCK BANTAM, BARRED
CHARACT: Same as Barred Plymouth Rock, except smaller body.
SOURCE: 9, 17, 53, 95, 112, 158, 210, 214, 221, 258, 262,

967 PLYMOUTH ROCK BANTAM, BLACK
CHARACT: Same as Barred Plymouth Rock Bantam, except PLUMAGE: black, see section VI-1.
SOURCE: 139, 234, 253, 262,

968 PLYMOUTH ROCK, BLUE
CHARACT: Same as Barred Plymouth Rock, except PLUMAGE: blue, see section VI-1b.
SOURCE: 119, 231,

969 PLYMOUTH ROCK, BUFF
CHARACT: Same as Barred Plymouth Rock, except PLUMAGE: all buff, see sections VI-4e and 7d.
SOURCE: 41, 50, 60, 71, 127, 134, 164, 172, 174, 202, 253, 258,

970 PLYMOUTH ROCK BANTAM, BUFF
CHARACT: Same as Buff Plymouth Rock, except smaller body.
SOURCE: 9, 17, 59, 202, 221, 253, 258,

971 PLYMOUTH ROCK, COLUMBIAN
CHARACT: Same as Barred Plymouth Rock, except PLUMAGE: columbian, see section VI-5d.
SOURCE: 127, 183, 258,

972 PLYMOUTH ROCK BANTAM, COLUMBIAN
CHARACT: Same as Columbian Plymouth Rock, except smaller body size.
SOURCE: 17, 164, 183, 197, 253, 258,

973 PLYMOUTH ROCK, PARTRIDGE
CHARACT: Same as Barred Plymouth Rock, except PLUMAGE: partridge, see section VI-5c.
SOURCE: 41, 127, 251, 139, 164, 227, 253, 258,

974 PLYMOUTH ROCK BANTAM, PARTRIDGE
CHARACT: Same as Partridge Plymouth Rock, except smaller body size.
SOURCE: 164, 221, 253, 258,

975 PLYMOUTH ROCK, SILVER PENCILED
CHARACT: Same as Barred Plymouth Rock, except PLUMAGE: penciled, see section VI-5c.
SOURCE: 127, 149, 164, 258,

976 PLYMOUTH ROCK BANTAM, SILVER PENCILED
CHARACT: Same as Silver Penciled Plymouth Rock, except smaller body size.
SOURCE: 95, 139, 149, 167, 253, 258,

977 PLYMOUTH ROCK BANTAM, SPLASH
CHARACT: Same as Barred Plymouth Rock Bantam, except PLUMAGE: splash, white with large irregular blobs of blue, see section VI-1c.
SOURCE: 149,

978 PLYMOUTH ROCK, WHITE
CHARACT: Same as Barred Plymouth Rock, except PLUMAGE: white (*c*), see sections VI-1j, 4f, 5i, and 7e.
SOURCE: 14, 41, 86, 93, 106, 127, 143, 156, 164, 169, 172, 174, 200, 213, 214, 253, 258,

979 PLYMOUTH ROCK, WHITE (SILVER)
CHARACT: Same as White Plymouth Rock, except known to be pure for sex-linked silver plumage color gene (*S*).
SOURCE: 145,

980 PLYMOUTH ROCK BANTAM, WHITE
CHARACT: Same as White Plymouth Rock, except smaller body.
SOURCE: 41, 98, 112, 140, 143, 172, 202, 213, 214, 221, 234, 252, 253, 258,

981 PLYMOUTH ROCK, WHITE DWARF
CHARACT: Same as White Plymouth Rock, except smaller body because of sex-linked dwarf gene (*dw*).
SOURCE: 14,

982 POLISH, BLACK (POLAND)
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: duplex (D^V) -- EYES: reddish bay -- EARLOBES: white -- SHANKS: slaty blue (id^+) -- PLUMAGE: black, see section VI-1 -- OTHER: crested (*Cr*), presence or absence of muffs and beard not indicated.
SOURCE: 211,

983 POLISH, BUFF LACED, NON-BEARDED
CHARACT: Same as Black Polish, except PLUMAGE: golden buff, each feather laced with white, see section VI-7d -- OTHER: non-bearded.
SOURCE: 4, 167, 211, 258,

984 POLISH BANTAM, BUFF LACED, NON-BEARDED
CHARACT: Same as Non-Bearded Buff Laced Polish, except smaller body size.
SOURCE: 167, 211,

985 POLISH, BUFF LACED, BEARDED
CHARACT: Same as Non-Bearded Buff Laced Polish, except OTHER: muffs and beard (*Mb*).
SOURCE: 127, 164, 167, 211, 258,

986 POLISH BANTAM, BUFF LACED, BEARDED
CHARACT: Same as Bearded Buff Laced Polish, except smaller body size.
SOURCE: 211, 258,

987 POLISH, BUFF LACED
CHARACT: Same as Non-Bearded Buff Laced Polish, except OTHER: presence of absence of muffs and beard not indicated.
SOURCE: 210, 211, 221,

988 POLISH BANTAM, BUFF LACED
CHARACT: Same as Buff Laced Polish, except smaller body.
SOURCE: 85, 164, 184, 211, 212,

989 POLISH BANTAM, BUFF LACED, FRIZZLE
CHARACT: Same as Buff Laced Polish Bantam, except OTHER: frizzled or curled feathers (*F*).
SOURCE: 85,

990 POLISH, GOLDEN, NON-BEARDED
CHARACT: Same as Non-Bearded Buff Laced Polish, except PLUMAGE: golden bay, each feather laced with black, see section VI-1h.
SOURCE: 4, 41, 172, 211, 258,

991 POLISH BANTAM, GOLDEN, NON-BEARDED
CHARACT: Same as Non-Bearded Golden Polish, except smaller body size.
SOURCE: 167, 211,

992 POLISH, GOLDEN, BEARDED
CHARACT: Same as Non-Bearded Golden Polish, except OTHER: muffs and beard (*Mb*).
SOURCE: 4, 127, 211, 258,

993 POLISH, GOLDEN
CHARACT: Same as Non-Bearded Golden Polish, except OTHER: presence or absence of muffs and beard not indicated.
SOURCE: 71, 211, 221,

994 POLISH BANTAM, GOLDEN
CHARACT: Same as Golden Polish, except smaller body.
SOURCE: 211, 212,

995 POLISH, SILVER, NON-BEARDED
CHARACT: Same as Non-Bearded Buff Laced Polish except PLUMAGE: white, each feather laced with black, see section VI-1h.
SOURCE: 41, 127, 164, 167, 172, 211, 258,

996 POLISH, SILVER, BEARDED
CHARACT: Same as Non-Bearded Silver Polish, except OTHER: muffs and beard (*Mb*).
SOURCE: 211, 258,

997 POLISH BANTAM, SILVER, BEARDED
CHARACT: Same as Bearded Silver Polish, except smaller body size.
SOURCE: 167, 211,

998 POLISH, SILVER
CHARACT: Same as Non-Bearded Silver Polish, except OTHER: presence or absence of muffs and beard not indicated.
SOURCE: 95, 211,

999 POLISH BANTAM, SILVER
CHARACT: Same as Silver Polish, except smaller body.
SOURCE: 41, 180, 211, 212,

1000 POLISH, WHITE, NON-BEARDED
CHARACT: Same as Non-Bearded Buff Laced Polish, except PLUMAGE: white (*I*), see sections VI-1j, 5i and 7e.
SOURCE: 167, 172, 211, 258,

1001 POLISH BANTAM, WHITE, NON-BEARDED
CHARACT: Same as Non-Bearded White Polish, except smaller body size.
SOURCE: 211,

1002 POLISH, WHITE, BEARDED
CHARACT: Same as Non-Bearded White Polish, except OTHER: muffs and beard (*Mb*).
SOURCE: 134, 164, 167, 211, 258,

1003 POLISH BANTAM, WHITE, BEARDED
CHARACT: Same as Bearded White Polish, except smaller body size.
SOURCE: 167, 211,

1004 POLISH WHITE
CHARACT: Same as Non-Bearded White Polish, except OTHER: presence or absence of muffs and beard not indicated.
SOURCE: 41, 127, 211,

1005 POLISH BANTAM, WHITE
CHARACT: Same as White Polish, except smaller body.
SOURCE: 211, 212,

1006 POLISH, WHITE CRESTED BLACK
CHARACT: Same as Non-Bearded Buff Laced Polish, except PLUMAGE: crest is white, rest of bird is black, see section VI-10.
SOURCE: 4, 41, 137, 127, 134, 164, 167, 195, 200, 210, 211, 258,

1007 POLISH BANTAM, WHITE-CRESTED BLACK
CHARACT: Same as White-Crested Black Polish, except smaller body size.
SOURCE: 158, 164, 165, 197, 211, 212, 221, 258,

1008 POLISH BANTAM, WHITE-CRESTED BLUE
CHARACT: Same as White-Crested Black Polish Bantam, except PLUMAGE: crest is white, rest of bird is blue, see section VI-10a.
SOURCE: 165, 184, 196, 197, 211, 212,

1009 POLBAR
CHARACT: This is a Polish autosexing breed which was started in 1953 by crossing a Barred Plymouth Rock cock with Partridge Greenleg females, in order to transfer the sex-linked genes bar (*B*) and silver (*S*) into the allelomorphic recessive genes for non-barring (b^+) and gold (s^+). The flock is highly inbred and susceptible to changes in environmental conditions as a pure breed. Crosses with other breeds however show considerable resistance to environmental changes, especially when Polbar females are used for crosses.
SOURCE: 40,

1010 POTCHEFSTROM KOEKNEK
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: sex-linked barred, see section VI-1e.
SOURCE: 41,

1011 REDCAP (DERBYSHIRE REDCAP)
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: immense rose (*R*) -- EYES: reddish bay -- EARLOBES: red -- SHANKS: leaden blue (id^+) -- PLUMAGE: half-moon spangled, see section VI-1l.
SOURCE: 63, 69, 71, 77, 127, 164, 225, 231,

1012 REDCAP BANTAM
CHARACT: Same as Redcap, except smaller body size.
SOURCE: 231,

1013 RHODEBAR
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: dark buff-red barred with buff and buff-red. This is an autosexing breed. Male chicks are much paler and washed out than female chicks.
SOURCE: 74,

1014 RHODE ISLAND RED
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: dark red, "black-tailed" columbian, see section VI-7c.
SOURCE: 4, 14, 20, 41, 48, 60, 63, 71, 77, 81, 82, 86, 87, 90, 106, 127, 130, 138, 145, 164, 169, 172, 175, 202, 204, 210, 218, 228, 245, 258,

1015 RHODE ISLAND RED BANTAM
CHARACT: Same as Rhode Island Red, except smaller body size.
SOURCE: 41, 59, 63, 81, 85, 95, 109, 130, 164, 194, 202, 210, 221, 245, 258,

1016 RHODE ISLAND RED, ROSE COMB
CHARACT: Same as Rhode Island Red, except COMB: rose (*R*).
SOURCE: 4, 41, 125, 130, 228, 258,

1017 RHODE ISLAND RED BANTAM, ROSE COMB
CHARACT: Same as Rose Comb Rhode Island Red, except smaller body size.
SOURCE: 41, 130, 211, 228, 258,

1018 RHODE ISLAND WHITE
CHARACT: Same as Rhode Island Red, except PLUMAGE: pure for sex-linked silver (*S*) and dominant white (*I*), see section VI-7e.
SOURCE: 145, 184,

1019 RHODE ISLAND WHITE BANTAM
CHARACT: Same as Rhode Island White, except smaller body size.
SOURCE: 226,

1020 ROSECOMB BANTAM, BARRED
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: rose (R) -- EYES: reddish bay -- EARLOBES: white -- SHANKS: white -- PLUMAGE: sex-linked barred, see section VI-1e -- OTHER: small body size.
SOURCE: 4, 90, 161,

1021 ROSECOMB BANTAM, BLACK
CHARACT: Same as Barred Rosecomb Bantam, except EYES: brown (br) -- SHANKS: black (id^+) -- PLUMAGE: black, see section VI-1.
SOURCE: 4, 41, 90, 120, 140, 164, 175, 184, 195, 202, 210, 213, 217, 219, 228, 258, 260,

1022 ROSECOMB BANTAM, BLACK BREASTED RED
CHARACT: Same as Barred Rosecomb Bantam, except SHANKS: slaty blue (id^+) -- PLUMAGE: black breasted red, see section VI-3.
SOURCE: 231,

1023 ROSECOMB BANTAM, BLUE
CHARACT: Same as Black Rosecomb Bantam, except SHANKS: bluish slate (id^+) -- PLUMAGE: blue, see section VI-1b.
SOURCE: 4, 90, 164, 184, 219, 258,

1024 ROSECOMB BANTAM, WHITE
CHARACT: Same as Barred Rosecomb Bantam, except PLUMAGE: white (I), see sections VI-1j, 2e, 3i, 4f.
SOURCE: 164, 258,

1025 RUMPLESS (PERSIAN RUMPLESS)
CHARACT: EGGS: brown -- SKIN: yellow (w) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (Id) -- PLUMAGE: various colors -- OTHER: rumpless (Rp).
SOURCE: 49, 69, 164,

1026 RUMPLESS BANTAM
CHARACT: Same as Rumpless, except smaller body size.
SOURCE: 41, 211,

1027 SCHAMOO, BLACK
CHARACT: EGGS: green (O) -- SKIN: yellow (w) -- COMB: cushion (R,P) -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (Id) -- PLUMAGE: black, see section VI-1 -- OTHER: rumpless (Rp).
SOURCE: 155,

1028 SCOTS DUMPY, BLACK (CREEPER)
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: single -- EYES: red -- EARLOBES: red -- SHANKS: black (Id) -- PLUMAGE: black, see section VI-1 -- OTHER: short legs (Cp).
SOURCE: 71,

1029 SCOTS GREYS
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: single -- EYES: amber -- EARLOBES: red -- SHANKS: white (Id) -- PLUMAGE: cuckoo barred, see section VI-1e.
SOURCE: 17, 71,

1030 SEBRIGHT BANTAM, GOLDEN
CHARACT: EGGS: brown -- SKIN: white (W^+) -- COMB: rose (R) -- EYES: brown (br) -- EARLOBES: purplish red -- SHANKS: slaty blue (id^+) -- PLUMAGE: golden -- OTHER: males are henny feathered (Hf), small body size.
SOURCE: 4, 41, 71, 84, 94, 96, 108, 127, 251, 168, 164, 173, 193, 211, 213, 217, 227, 228, 258, 260,

1031 SEBRIGHT BANTAM, SILVER
CHARACT: Same as Golden Sebright Bantam, except PLUMAGE: white, each feather laced with black, see section VI-1h.
SOURCE: 41, 60, 69, 71, 84, 108, 127, 168, 155, 164, 173, 193, 217, 227, 228, 258,

1032 SHAMO BANTAM, BLACK
CHARACT: EGGS: tinted -- SKIN: yellow (w) -- COMB: pea (P) -- EYES: pearl -- EARLOBES: red -- SHANKS: yellow (Id) -- PLUMAGE: black, see section VI-1 -- OTHER: small body size.
SOURCE: 185,

1033 SHAMO BANTAM, BUFF COLUMBIAN
CHARACT: Same as Black Shamo Bantam, except PLUMAGE: columbian, gold color phase, see section VI-5d.
SOURCE: 185,

1034 SHAMO BANTAM, WHITE
CHARACT: Same as Black Shamo Bantam, except PLUMAGE: white (c), see section VI-2e, 3i, 4f, and; 5i.
SOURCE: 185,

1035 SHAMO, VARIOUS COLORS
CHARACT: Same as Black Shamo, except PLUMAGE: various colors.
SOURCE: 89, 99, 113, 164, 185, 228,

1036 SILKIE, BLACK BEARDED
CHARACT: EGGS: white -- SKIN: dark blue (W^+) -- COMB: walnut (R,P) -- EYES: black -- EARLOBES: turquoise blue -- SHANKS: leaden blue -- PLUMAGE: black, see section VI-1 -- OTHER: crest (Cr), muffs and beard (Mb), five toes (Po), feathered shanks, silkie feathers (h), and black pigmented skin (Fm).
SOURCE: 211,

1037 SILKIE BANTAM, BLACK BEARDED
CHARACT: Same as Bearded Black Silkie, except smaller body size.
SOURCE: 155, 164, 211, 219, 221, 242, 243, 258,

1038 SILKIE BANTAM, BLACK NON-BEARDED
CHARACT: Same as Bearded Black Silkie Bantam, except OTHER: non-bearded.
SOURCE: 211, 221,

1039 SILKIE, BLACK
CHARACT: Same as Bearded Black Silkie, except OTHER: presence or absence of muff and beard not indicated.
SOURCE: 71, 211,

1040 SILKIE BANTAM, BLACK
CHARACT: Same as Black Silkie, except smaller body size.
SOURCE: 127, 167, 172, 209, 211, 212, 228, 260,

1041 SILKIE BANTAM, BLUE BEARDED
CHARACT: Same as Bearded Black Silkie Bantam, except PLUMAGE: blue, see section VI-1b.
SOURCE: 242, 243,

1042 SILKIE BANTAM, BLUE
CHARACT: Same as Bearded Blue Silkie Bantam, except OTHER: presence or absence of muff and beard not indicated.
SOURCE: 165, 172,

1043 SILKIE BANTAM, BUFF BEARDED
CHARACT: Same as Black Bearded Silkie Bantam, except PLUMAGE: all buff, see section VI-4e and 7d.
SOURCE: 71, 164, 172, 242, 243, 258,

1044 SILKIE BANTAM, BUFF NON-BEARDED
CHARACT: Same as Bearded Buff Silkie Bantam, except OTHER: non-bearded.
SOURCE: 140,

1045 SILKIE BANTAM, GRAY
CHARACT: Same as Black Silkie Bantam, except PLUMAGE: gray, see section VI-2c.
SOURCE: 172, 209,

1046 SILKIE BANTAM, GRAY BEARDED
CHARACT: Same as Gray Silkie Bantam, except OTHER: muffs and beard (*Mb*).
SOURCE: 221, 242, 243,

1047 SILKIE BANTAM, GRAY NON-BEARDED
CHARACT: Same as Bearded Gray Silkie Bantam, except OTHER: non-bearded.
SOURCE: 221,

1048 SILKIE BANTAM, PARTRIDGE BEARDED
CHARACT: Same as Bearded Black Silkie Bantam, except PLUMAGE: partridge, see section VI-5c.
SOURCE: 221, 243,

1049 SILKIE BANTAM, PARTRIDGE NON-BEARDED
CHARACT: Same as Bearded Partridge Silkie Bantam, except OTHER: non-bearded.
SOURCE: 221,

1050 SILKIE BANTAM, PARTRIDGE
CHARACT: Same as Bearded Partridge Silkie Bantam, except OTHER: presence or absence of muff and beard not indicated.
SOURCE: 71, 164, 172, 180, 258,

1051 SILKIE BANTAM, RED BEARDED
CHARACT: Same as Bearded Black Silkie Bantam, except PLUMAGE: all red, see section VI-5g.
SOURCE: 243,

1052 SILKIE BANTAM, SILVER GRAY BEARDED
CHARACT: Same as Bearded Black Silkie Bantam, except PLUMAGE: silver color phase of black breasted red, see section VI-3c.
SOURCE: 175,

1053 SILKIE BANTAM, SILVER GRAY NON-BEARDED
CHARACT: Same as Bearded Silver Gray Silkie Bantam, except OTHER: non-bearded.
SOURCE: 175,

1054 SILKIE, WHITE NON-BEARDED
CHARACT: Same as Bearded Black Silkie, except PLUMAGE: white (*c*), see sections VI-1j, 2e, 3i, 4f, 5i, and 7e -- OTHER: non-bearded.
SOURCE: 70, 211,

1055 SILKIE BANTAM, WHITE NON-BEARDED
CHARACT: Same as Non-Bearded White Silkie, except smaller body size.
SOURCE: 17, 151, 209, 211, 221, 243,

1056 SILKIE BANTAM, WHITE BEARDED
CHARACT: Same as Non-Bearded White Silkie Bantam, except OTHER: muffs and beard (*Mb*).
SOURCE: 151, 161, 164, 165, 167, 175, 176, 211, 221, 228, 243, 257, 258,

1057 SILKIE, WHITE
CHARACT: Same as Non-Bearded White Silkie, except OTHER: presence or absence of muffs and beard not indicated.
SOURCE: 71, 81, 211,

1058 SILKIE BANTAM, WHITE
CHARACT: Same as White Silkie, except smaller body size.
SOURCE: 60, 108, 127, 172, 180, 210, 211, 212,

1059 SILKIE, VARIOUS COLORS
CHARACT: Same as Black Silkie, except PLUMAGE: various colors.
SOURCE: 41, 54, 67,

1060 SILKIE BANTAM, VARIOUS COLORS
CHARACT: Same as Various Colors Silkie except, smaller body size.
SOURCE: 51,

1061 SPANISH, BARRED
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: single -- EYES: brown (*br*) -- EARLOBES: white -- SHANKS: dark slate (Id^+) -- PLUMAGE: sex-linked barred, see section VI-1e.
SOURCE: 123,

1062 SPANISH, BLACK (CASTELLANA NEGRA)
CHARACT: Same as Barred Spanish, except PLUMAGE: black, see section VI-1.
SOURCE: 43, 78, 123, 164,

1063 SPANISH, WHITE-FACED BLACK
CHARACT: Same as Black Spanish, except OTHER: enlarged earlobes, meeting in front and extending below the wattles, face white.
SOURCE: 43, 71, 107, 126, 127, 167, 174, 210, 225, 228, 237, 258,

1064 SPANISH BANTAM, WHITE-FACED BLACK
CHARACT: Same as White-Faced Black Spanish, except smaller body size.
SOURCE: 107, 211,

1065 SPANISH GAME, BLACK BREASTED RED
CHARACT: EGGS: brown -- SKIN: white (W^+) -- COMB: single -- EYES: red -- EARLOBES: red -- SHANKS: white (*Id*) -- PLUMAGE: black breasted red, see section VI-3.
SOURCE: 113,

1066 SPANISH GAME, BLUE
CHARACT: Same as Black Breasted Red Spanish Game, except PLUMAGE: blue, see section VI-1b.
SOURCE: 122,

1067 SPANISH GAME, PYLE
CHARACT: Same as Black Breasted Red Spanish Game, except PLUMAGE: pyle black breasted red, see section VI-3f.
SOURCE: 122,

1068 SPANISH GAME, WHITE
CHARACT: Same as Black Breasted Red Spanish Game, except PLUMAGE: white (*c*) , see sections VI-1j and 3i.
SOURCE: 200,

1069 SULTAN, WHITE
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: duplex (D^V) -- EYES: reddish bay -- EARLOBES: red -- SHANKS: bluish slate (Id^+) -- PLUMAGE: white (*c*) , see section VI-1j -- OTHER: crest (*Cr*), muffs and beard (*Mb*), vulture hocks (*v*), five toes (*Po*) and feathered shanks.
SOURCE: 95, 204,

1070 SULTAN BANTAM, WHITE
CHARACT: Same as White Sultan, except smaller body size.
SOURCE: 90, 228,

1071 SULTAN, VARIOUS COLORS
CHARACT: Same as White Sultan, except PLUMAGE: various colors.
SOURCE: 51, 74, 127, 134, 166, 201,

1072 SUMATRA, BLACK
CHARACT: EGGS: tinted -- SKIN: yellow (*w*) -- COMB: pea (*P*) -- EYES: brown (*br*) -- EARLOBES: gypsy color -- SHANKS: black; bottom of feet yellow (Id^+) -- PLUMAGE: black, see section VI-1 -- OTHER: multiple spurs (*M*)
SOURCE: 49, 51, 54, 67, 70, 155, 164, 167, 172, 210, 220, 221, 228, 258,

1073 SUMATRA BANTAM, BLACK
CHARACT: Same as Black Sumatra, except smaller body size.
SOURCE: 51, 227, 250,

1074 SUMATRA, BLUE
CHARACT: Same as Black Sumatra, except PLUMAGE: blue, see section VI-1b.
SOURCE: 51, 155,

1075 SUMATRA, SILVER PENCILLED
CHARACT: Same as Black Sumatra, except PLUMAGE: pencilled see section VI-5c.
SOURCE: 155,

1076 SUMATRA, VARIOUS COLORS
CHARACT: Same as Black Sumatra, except PLUMAGE: various colors.
SOURCE: 71,

1077 SUSSEX, BUFF
CHARACT: EGGS: brown -- SKIN: white (W^+) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: white (*Id*) -- PLUMAGE: columbian, gold color phase, see section VI-5d.
SOURCE: 71,

1078 SUSSEX, LIGHT
CHARACT: Same as Buff Sussex, except PLUMAGE: columbian, see section VI-5d.
SOURCE: 14, 17, 20, 41, 48, 55, 60, 70, 71, 80,

1079 SUSSEX BANTAM, LIGHT
CHARACT: Same as Light Sussex, except smaller body size.
SOURCE: 17, 41, 53, 76, 77, 80, 81,

1080 SUSSEX BANTAM, RED
CHARACT: Same as Light Sussex Bantam, except PLUMAGE: mahogany red, "black-tailed: columbian, see section VI-7c.
SOURCE: 41,

1081 SUSSEX BANTAM, SILVER
CHARACT: Same as Light Sussex Bantam, except PLUMAGE: silver color phase of black breasted red, see section VI-2c.
SOURCE: 41,

1082 SUSSEX, SPECKLED
CHARACT: Same as Buff Sussex; except PLUMAGE: speckled, mahogany bay, see section VI-7c.
SOURCE: 41, 71, 127, 164, 175, 202, 228, 258,

1083 SUSSEX BANTAM, SPECKLED
CHARACT: Same as Speckled Sussex, except smaller body size.
SOURCE: 76, 180, 202, 258,

1084 THURINGER BEARDED, SILVER SPANGLED
CHARACT: EGGS: white -- SKIN: white (W^+) -- COMB: single -- EYES: reddish -- EARLOBES: white -- SHANKS: bluish slate (Id^+) -- PLUMAGE: white, each feather ending with a black spangle, muffs and beard black, male tail black, see section VI-1i -- OTHER: muffs and beard (*Mb*).
SOURCE: 108,

1085 TRANSYLVANIAN NAKED NECK, BARRED
CHARACT: EGGS: tinted -- SKIN: white (W^+) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: white (*Id*) -- PLUMAGE: sex-linked barred, see section VI-1e -- OTHER: naked neck (*Na*).
SOURCE: 32,

1086 TRANSYLVANIAN NAKED NECK, BLACK
CHARACT: Same as Barred Transylvanian Naked Neck, except SHANKS: black -- PLUMAGE: black, see section VI-1.
SOURCE: 32, 211,

1087 TUZO JAPANESE GAME, BLACK
CHARACT: EGGS: tinted -- SKIN: yellow (*w*) -- COMB: pea (*P*) -- EYES: pearl -- EARLOBES: red -- SHANKS: black (id^+) -- PLUMAGE: black, see section VI-1.
SOURCE: 185,

1088 VORWERK
CHARACT: EGGS: tinted -- SKIN: white (W^+) -- COMB: single -- EYES: deep red --EARLOBES: white -- SHANKS: slate (id^+) -- PLUMAGE: golden "Lakenvelder" columbian, see section VI-9a.
SOURCE: 54,

1089 WATERMAAL, QUAIL
CHARACT: EGGS: brown -- SKIN: white (W^+) -- COMB: rose with three spikes (*R*) -- EYES: black -- EARLOBES: red -- SHANKS: black (id^+) -- PLUMAGE: quail, see section VI-8 -- OTHER: tassel crest (*Cr*), muffs and beard (*Mb*).
SOURCE: 62,

1090 WELBAR
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: single -- EYES: red -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: this is an autosexing breed. A silver duckwing pattern with barring on black areas of males and faint barring on stippled areas of females.
SOURCE: 52,

1091 WELSUMMER, PARTRIDGE
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: single -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: partridge, see section VI-12.
SOURCE: 52, 55, 56, 61, 71, 204,

1092 WYANDOTTE BANTAM, BARRED
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: rose (*R*) -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: sex-linked barred, see section VI-1e -- OTHER: small body size.
SOURCE: 70, 71,

1093 WYANDOTTE, BLACK
CHARACT: Same as Barred Wyandotte Bantam, except standard body size.
SOURCE: 167,

1094 WYANDOTTE BANTAM, BLACK
CHARACT: Same as Black Wyandotte, except smaller body size.
SOURCE: 4, 63, 71, 162, 202, 210, 258,

1095 WYANDOTTE BANTAM, BLUE
CHARACT: Same as Black Wyandotte Bantam, except PLUMAGE: blue, see section VI-1b.
SOURCE: 4, 258,

1096 WYANDOTTE BANTAM, BLUE LACED GOLDEN (VIOLETTE)
CHARACT: Same as Black Wyandotte Bantam, except PLUMAGE: golden bay with blue lace, see section VI-5e.
SOURCE: 71, 73, 128,

1097 WYANDOTTE BANTAM, BLUE LACED SILVER
CHARACT: Same as Barred Wyandotte Bantam, except PLUMAGE: white with blue lace, see section VI-5e.
SOURCE: 71, 73, 128,

1098 WYANDOTTE, BUFF
CHARACT: Same as Black Wyandotte, except PLUMAGE: all buff, see section VI-4e and 7d.
SOURCE: 164, 167, 202, 258,

1099 WYANDOTTE BANTAM, BUFF
CHARACT: Same as Buff Wyandotte, except smaller body size.
SOURCE: 4, 202, 258,

1100 WYANDOTTE, BUFF LACED
CHARACT: Same as Black Wyandotte, except PLUMAGE: buff with white lace, see section VI-5e.
SOURCE: 63,

1101 WYANDOTTE BANTAM, BUFF LACED
CHARACT: Same as Buff Laced Wyandotte, except smaller body size.
SOURCE: 71, 73,

1102 WYANDOTTE, COLUMBIAN
CHARACT: Same as Black Wyandotte, except PLUMAGE: columbian, see section VI-5d.
SOURCE: 4, 127, 164, 228, 258,

1103 WYANDOTTE BANTAM, COLUMBIAN
CHARACT: Same as Columbiab Wyandotte, except smaller body size.
SOURCE: 4, 71, 164, 258,

1104 WYANDOTTE, GOLDEN LACED
CHARACT: Same as Black Wyandotte, except PLUMAGE: golden bay with black lace, see section VI-5e.
SOURCE: 41, 60, 63, 71, 127, 167, 200, 228, 258,

1105 WYANDOTTE BANTAM, GOLDEN LACED
CHARACT: Same as Golden Laced Wyandotte, except smaller body size.
SOURCE: 4, 41, 53, 128, 228, 258,

1106 WYANDOTTE, PARTRIDGE
CHARACT: Same as Black Wyandotte, except PLUMAGE: partridge, see section VI-5c.
SOURCE: 71, 164, 174, 258,

1107 WYANDOTTE BANTAM, PARTIDGE
CHARACT: Same as Partridge Wyandotte, except smaller body size.
SOURCE: 41, 53, 75, 79, 164, 228, 258, 260,

1108 WYANDOTTE, SILVER LACED
CHARACT: Same as Black Wyandotte, except PLUMAGE: white with black lace, see section VI-5e.
SOURCE: 4, 60, 63, 71, 127, 148, 158, 164, 174, 228, 258,

1109 WYANDOTTE BANTAM, SILVER LACED
CHARACT: Same as Silver Laced Wyandotte, except smaller body size.
SOURCE: 41, 54, 95, 124, 128, 158, 164, 180, 213, 228, 258, 260,

1110 WYANDOTTE, SILVER PENCILED
CHARACT: Same as Black Wyandotte, except PLUMAGE: penciled, see section VI-5c.
SOURCE: 127, 154, 164, 167, 174, 258,

1111 WYANDOTTE BANTAM, SILVER PENCILED
CHARACT: Same as Silver Penciled Wyandotte, except smaller body size.
SOURCE: 4, 53, 258,

1112 WYANDOTTE, WHITE
CHARACT: Same as Black Wyandotte, except PLUMAGE: white (*c*), see sections VI-1j, 3i, 4f, 5i, and 7e.
SOURCE: 20, 41, 59, 71, 80, 93, 112, 127, 148, 164, 172, 258,

1113 WYANDOTTE BANTAM, WHITE
CHARACT: Same as White Wyandotte, except smaller body size.
SOURCE: 41, 59, 71, 76, 81, 85, 251, 141, 143, 162, 202, 258, 260,

1114 WYANDOTTE BANTAM, VARIOUS COLORS
CHARACT: Same as Barred Wyandotte Bantam, except PLUMAGE: various colors.
SOURCE: 126,

1115 YOKOHAMA, BLACK RED
CHARACT: EGGS: brown -- SKIN: yellow (*w*) -- COMB: walnut (*R,P*) or pea (*P*) -- EYES: reddish bay -- EARLOBES: red -- SHANKS: yellow (*Id*) -- PLUMAGE: black breasted red, see section VI-3 -- OTHER: saddle sickle and tail covert feathers are extremely abundant and extremely long in older birds (*Gt, mt*).
SOURCE: 74,

1116 YOKOHAMA BANTAM, BLACK RED
CHARACT: Same as Black Red Yokohama, except smaller body size.
SOURCE: 51, 74,

1117 YOKOHAMA BANTAM, BLUE RED
CHARACT: Same as Black Red Yokohama Bantam, except PLUMAGE: blue color phase of black breasted red, see section VI-3e.
SOURCE: 51,

1118 YOKOHAMA, GOLDERN DUCKWING
CHARACT: Same as Black Red Yokohama, except PLUMAGE: silver color phase of black breasted red, see section VI-3c.
SOURCE: 74,

1119 YOKOHAMA BANTAM, GOLDERN DUCKWING
CHARACT: Same as Goldern Duckwing Yokohama, except smaller body size.
SOURCE: 51, 159,

1120 YOKOHAMA, RED
CHARACT: Same as Black Red Yokohama, except PLUMAGE: red, see section VI-5g.
SOURCE: 155,

1121 YOKOHAMA, RED SADDLE
CHARACT: Same as Black Red Yokohama, except PLUMAGE: red saddle, see section VI-9b.
SOURCE: 185,

1122 YOKOHAMA, SILVER DUCKWING
CHARACT: Same as Black Red Yokohama, except PLUMAGE: silver color phase of black breasted red, see section VI-3c.
SOURCE: 74,

1123 YOKOHAMA BANTAM, SILVER DUCKWING
CHARACT: Same as Silver Duckwing Yokohama, except smaller body size.
SOURCE: 51, 74,

1124 YOKOHAMA, WHITE
CHARACT: Same as Black Red Yokohama, except PLUMAGE: white (*c*), see section VI-3i.
SOURCE: 51, 155,

1125 YOKOHAMA BANTAM, WHITE
CHARACT: Same as White Yokohama, except smaller body size.
SOURCE: 51,

1126 YOKOHAMA, VARIOUS COLORS
CHARACT: Same as Black Red Yokohama, except PLUMAGE: various colors.
SOURCE: 127, 164, 224,

1127 YOKOHAMA BANTAM, VARIOUS COLORS
CHARACT: Same as Various Colors Yokohama, except smaller body size.
SOURCE: 41, 159,

JAPANESE QUAIL

(Coturnix coturnix japonica)

1128 PHARAOH (WILD TYPE PLUMAGE)
CHARACT: A mixture of colors with black and various shades of brown predominating. The back and hackle feathers are brown transversed by a black bar and have a wheat-straw colored shafting. The wing bows are a medium brown, the top of the head is dark brown and cream white lines radiate along each side of the face. In males, the face and throat are rusty brown, the upper breast is cinnamon and the lower breast is tan. In females, the face and throat and upper breast are light cinnamon with black speckles on the upper breast and the lower breast is tan to white.
SOURCE: 6, 7, 10, 19, 91, 106, 114, 118, 142, 160, 164, 190, 208, 211, 218, 247, 256, 257,

1129 AUSTRALIAN FAWN
CHARACT: The feather coloration of these quail is a light buff or fawn color. Females usually show some darker spots on the dorsal surface, while the head color of the males is a darker brown or rust color.
SOURCE: 257,

1130 BRITISH RANGE *(E/E)*
CHARACT: A dark-feather colored variety of quail in which the males and females are similarly pigmented. The dorsal and ventral surfaces are basically similar. The individual feather pattern is similar to that of the dorsal surface of the Pharaoh quail except that the wheat-straw shafting is absent. A small area of white feathers is present at the junction of the upper and lower beaks and on the throat under the lower beak.
SOURCE: 211, 257,

1131 ENGLISH WHITE *(wh/wh)*
CHARACT: A white feathered variety of quail with dark eyes. Some may show a few black spots.
SOURCE: 211, 257,

1132 MANCHURIAN GOLDEN *(Y/y^+)*
CHARACT: A mixture of colors, but resulting in an overall appearance of a rich, gold wheat-straw colored bird. The back and hackle feathers are dark brown but with a very wide wheat-straw colored shafting. Shafting is present on the wing bows and the top of the head is a wheat-straw yellow color. In males, the face and throat are rusty brown, the upper breast is cinnamon and the lower breast is tan. In females, the face, throat and upper breast are light cinnamon with black speckles on the upper breast and lower breast is tan to white.
SOURCE: 211, 257,

1133 TUXEDO *(E/E, Wh^+/wh)*
CHARACT: A two-color variety of quail. The ventral surface including the neck and face is white. The dorsal surface is an intermingling of black and brown similar to that of the British Range quail.
SOURCE: 211, 257,

TURKEY

(Meleagris gallopavo)

1134 BLACK *(B/B)*
CHARACT: Plumage a lustrous, metallic black throughout.
SOURCE: 71, 167, 203, 215,

1135 BLACK SPANISH *(B/B)*
CHARACT: Plumage a lustrous metallic black throughout.
SOURCE: 155, 164, 178,

1136 BOURBON RED *(b^+/b^+, r/r)*
CHARACT: Body plumage is a rich dark chestnut mahogany. Male feathers have a very narrow edging of black, while female feathers lack the black edging but show a narrow threadlike edging of white on the breast. Flight feathers are white. Tail is white with a red band near the end.
SOURCE: 71, 87, 160, 164, 167, 172, 178, 203, 171,

1137 BRONZE, BROAD BREASTED (WILD TYPE PLUMAGE)
CHARACT: Male feathers from the neck to the midback are copperish bronze, each terminating in a narrow black band. The rest of the body contour feathers are black with a wide bronze band near the end, followed by a narrow black band extending across the end. Female feathers are similar to those of the male, except for a terminal edging of white. The main tail and covert feathers are marked with alternating black and brown bands terminating with a bronze then a black band and finally an edging of white. The flight feathers are marked with alternating black and white bars. Body size is large with a broad breast.
SOURCE: 71, 134, 164, 167, 202, 203, 215, 256,

1138 BRONZE (WILD TYPE PLUMAGE)
CHARACT: Same as Broad Breasted Bronze (item 1137), except not as large or as broad breasted.
SOURCE: 20, 41, 77, 87, 156, 178, 218,

1139 BROWN, DARK *(b^+/b^+, e/e)*
CHARACT: Plumage pigment distribution is similar to that of the Bronze (item 1138), except that black is replaced by a reddish-brown.
SOURCE: 203,

1140 BUFF, JERSEY *(B/B, r/r)*
CHARACT: Body plumage is buff colored. Primary and secondary flight feathers are white. Tail feathers are white with a buff bar crossing each feather near the end.
SOURCE: 71, 178,

1141 LILAC (LILAC BUFF) *(b^+/b^+, r/r, sl/sl)*
CHARACT: These birds are a light slate color with unbarred, nearly white flight feathers and unpenciled slaty red tail feathers, some of which may be white in the middle.
SOURCE: 178,

1142 NARRAGANSETT *(b^+/b^+, n/n)*
CHARACT: Plumage pigment distribution is similar to the Bronze (item 1137), except that the bronze color is replaced by steel-gray.
SOURCE: 71, 164, 167, 178,

1143 NEBRASKAN SPOTTED (NEBRASKA ROYALES) *(b^+/b^+, sp/sp, n/n)*
CHARACT: These birds are white with black pigment scattered throughtout the plumage, there being more pigment in the areas of the neck, back and wings than other parts of the body.
SOURCE: 71,

1144 ROYAL PALM *(b^+/b^+, p/p, n/n)*
CHARACT: Feathers of the wings, breast and rear back are white, edged with black. The tail feathers are also white with a subterminal black band followed by a terminal white band.
SOURCE: 71, 103, 134, 164, 167, 178, 182, 209, 171,

1145 SLATE *(b^+/b^+, sl/sl)*
CHARACT: Plumage color is a light slate shade with barred flight and tail feathers.
SOURCE: 71, 178, 203,

1146 SLATE BLUE, LIGHT (DOMINANT SLATE) *(B/B, D/D)*
CHARACT: These birds are a uniform slaty blue color.
SOURCE: 71, 164, 211,

1147 WHITE *(c/c)*
CHARACT: Plumage is pure white.
SOURCE: 19, 71, 87, 218,

1148 WHITE, BROAD BREASTED *(c/c)*
CHARACT: Same as White (item 1147), except larger body size and broad breasted.
SOURCE: 41, 47, 164, 202,

1149 WHITE, BELTSVILLE *(c/c)*
CHARACT: Same as White (item 1147), except small body size. Mature body weight for toms is approximately 23 pounds and for hens 13 pounds.
SOURCE: 41,

1150 WHITE, MIDGET *(c/c)*
CHARACT: Same as White (item 1147), except small body size. Mature body weight for toms is approximately 13 pounds and for hens 9 pounds.
SOURCE: 256,

1151 WILD (WILD TYPE PLUMAGE)
CHARACT: Plumage color similar to the Bronze (item 1138). Somewhat smaller body with wilder temperament than standard domestic turkeys.
SOURCE: 71, 160, 164, 209, 211, 215, 218,

Descriptions of plumage colors in this section are not intended to represent the standards of the poultry fancier. The intent is to present a general description of the pigment distribution so that non-fanciers may visualize the plumage color phenotypes listed and see how their genotypes relate to each other. Phenotypes are listed according to the *E* locus alleles. Genotypes, as far as are known, are presented in parentheses for the various phenotypes. Some of these, indicated with an asterisk, are based wholly or in part on speculation.

VI. DESCRIPTIONS OF CHICKEN PLUMAGE COLORS

PLUMAGE COLORS BASED ON EXTENDED BLACK GENE *(E)*

1. BLACK *(E/E)*

Entire surface pure black. The head, hackle, back, saddle, sickles, and wing bows of the males should have a rich beetle-green sheen.

1a. Self-Blue Color Phase *(E/E, lav/lav)*
Entire surface an even shade of light slaty blue.

1b. Blue Color Phase *(E/E,Bl/bl$^+$,Co/Co,Ml/Ml,Pg/Pg)*
Entire surface a uniform shade of plain slaty blue clearly and sharply laced with bluish black.

1c. Splash Color Phase *(E/E, Bl/Bl)*
Entire surface slaty blue and white that has a faint bluish gray tinge. Blue in feathers in the form of large irregular shaped blobs.

1d. Mottled Color Phase *(E/E, mo/mo)*
Entire surface black, one feather in two-four ending in small V-shaped white tip.

1e. Barred Color Phase *(E/E, B/B, or B/-, S/S or S/-)*
Also referred to as "cuckoo" in some breeds. Plumage is evenly barred over entire body by regular parallel black and white alternating bars. Females are a darker shade than males.

1f. Exchequer Color Phase *(E/E, mo^{pi}/mo^{pi}, S/S or S/-)*
Black and white evenly distributed over all feathers. White in the surface color in the form of a large white blob.

1g. Erminette Color Phase *(E/E, Er/er$^+$, S/S or S/-)*
Plumage is varigated, being predominantly white, with a proportion of feathers all black or partly so.

1h. Laced Color Phase *(E/E, Co/Co, Pg/Pg, Ml/Ml)*
In "Silver" *(S/S or S/-)* Polish and Sebright breeds, each feather is white with a black lacing and in the "Golden" *(s$^+$/s$^+$ or s$^+$/-)* Polish and Sebright breeds, each feather is golden bay with a black lacing.

1i. Spangle Color Phase *(E/E, Db/Db, Ml/Ml/, Pg/Pg)*
In the "golden spangled" *(s$^+$/s$^+$ or s$^+$/-)* most of the feathers are golden bay, each feather tipped with a greenish black spangle. The tail is black and the primary flight's upper webs, black and lower webs, bay. The "golden neck" *(Bl/Bl)** is the same as the golden spangled except that black has been replaced with creamy white. "Silver spangled" *(Co/Co, S/S or S/-)** is similar to golden spangled except the golden bay has been replaced by white and the tail is white ending in black spangles. A different Co gene appears to be involved here.

1j. White Color Phase *(E/E, I/I or c/c)*
Entire surface pure white.

PLUMAGE COLORS BASED ON BIRCHEN GENE *(E^R)*

2. BIRCHEN *(E^R/E^R, S/S or S/-)*

White head, also white back and wing bows in males. Hackle and upper breast is black with each feather laced with white. Saddle in males is also black laced with white. All other feathers are black.

2a. Gold Color Phase *(E^R/E^R, s$^+$/s$^+$ or S$^+$/-)*
Referred to as "brown red" plumage, all areas described as white in No. 2 are deep orange in the gold phase.

2b. Blue Color Phase *(E^R/E^R, Bl/bl$^+$, S/S or S/-)*
Referred to as "silver blue" plumage, all areas described as black in No. 2 are blue.

2c. Gray Color Phase *(E^R/E^R, S/S or S/-)*
Referred to as "gray", same as birchen, No. 2, except whole breast black with feather laced with white.

2d. Lemon Color Phase *(E^R/E^R, S$^+$/s$^+$ or s$^+$/-)*
Referred to as "lemon blue" *(Bl/bl$^+$)*, "lemon black" *(bl$^+$/bl$^+$)* and "lemon laced white" *(Bl/Bl)* plumage color. All areas described as white in No. 2 are lemon color in all three plumages. Black is replaced with blue in the lemon blue and white splashed with blue in the laced white. Lemon black is also known as "golden birchen".

2e. White Color Phase *(E^R/E^R, I/I or c/c)*
Entire surface pure white.

PLUMAGE COLORS BASED ON WILD TYPE GENE *(e^+)*

3. BLACK BREASTED RED *(e^+/e^+, s$^+$/s$^+$ or s$^+$/-)*

Color of Male. Head, hackle, back, saddle and wing bows are orange red. Breast and rest of body is black. Wing primaries are black with lower web edged in bay. Secondaries are black with exposed portion of outer web being bay.

Color of Female. Head is golden-red and hackle is golden-orange striped with black. Back and wing shoulder fronts, bows and coverts are black, evenly and finely stippled with golden brown. Breast is salmon, body is ashy grey and the tail is black. Wing flights are black with lower web of primaries and exposed portion of outer web being finely stippled with golden brown.

3a. Another Gold Color Phase *(e^+/e^+, s$^+$/s$^+$ or s$^+$/-)*
"Light brown" plumage differs from No. 3 only in that the male hackle and saddle feathers have a dark strip

running down the center of each feather. Intensity of the black, brown and red pigments vary in these different types.

3b. Ginger Red Color Phase *(e^+/e^+, Db/Db, s^+/s^+ or $s^+/-$)* *
All head, hackle and body feathers are red to ginger red in the males and ginger yellow in the females. Black is restricted to flights and tail in both sexes except that the back and wings of the female are stippled and her hackle is striped.

3c. Silver Color Phases *(e^+/e^+, S/S or S/-)*
"Silver duckwing" also known as "silver gray" is the silver counterpart of No. 3. General pigment distributions are the same, except that all reddish coloration excepting the female's breast has been replaced with silvery white. "Silver" is the silver counterpart of No. 3a and its plumage is like the "silver duckwing" except the male hackle and saddle have black striping. The "golden duckwing" and "golden" also have the same general pigment distribution as No. 3, in which the term "golden" refers to the incomplete dominance of silver over gold resulting in dilution in males *(S/s^+)* and silver gray color in females *(S/-)*.

3d. Dark Gray or Colored *(e^+/e^+, Ml/Ml, S/S or S/-)**
Color of male. Head is light gray, hackle, back and saddle are black laced with light straw. Wing primaries are dark slate and secondaries are black with outer web white. All other feathers are black.

Color of female. Head is black, hackle is black laced with light straw, back and wing shoulders, fronts, bows, and coverts are black with straw colored shafting. Breast is dark salmon with lower edge of feathers marked with black. Tail and body are black slightly stippled with grey. Wing primaries are slaty brown and secondaries are black with outer web slightly stippled with grey.

3e. Blue Color Phase *(e^+/e^+, Bl/bl$^+$)*
"Blue red" *(s^+/s^+)*, "blue golden duckwing" *(S/s^+)*, and "blue silver duckwing" *(S/S)* are blue color phase variations and have the same general pigment distribution as No. 3, except that all black pigment has been replaced with white.

3f. Red Pyle Color Phase *(e^+/e^+, I/i, s^+/s^+ or $s^+/-$)*
"Red Pyle" plumage has the same general pigment distribution as No. 3, except that all black pigment has been replaced with white.

3g. Spangled Color Phase *(e^+/e^+, mo/mo, s^+/s^+ or $s^+/-$)*
"Spangled" plumage has the same general pigment distribution as No. 3a, except that most black feathers end with a small V-shaped white spangle and most red, salmon and brown stippled feathers end with a small V-shaped white spangle, a narrow black bar dividing the white from the balance of the feather.

3h. Barred Color Phase *(e^+/e^+, B/B or B/-, s^+/s^+ or $s^+/-$)*
"Crele" plumage has the same general pigment distribution as No. 3, except that the barring is evident in most feathers.

3i. White Color Phase *(e^+/e^+, I/I or c/c)*
Entire surface pure white.

PLUMAGE COLORS BASED ON DOMINANT WHEATEN GENE *(e^{Wh})*

4. WHEATEN *(e^{Wh}/e^{Wh}, s^+/s^+ or $s^+/-$)*

Color of Male. Pigment distribution the same as black breasted red male plumage. See black breasted red description, No. 3

Color of Female. Head and hackle is light brown to dark wheaten, tail is black with outer web edged with wheaten. Wing primaries are brownish-black with outer web medium wheaten, and secondaries are brownish black stippled with wheaten, outer web is wheaten. All other feathers are creamy wheaten.

4a. Silver Color Phase *(e^{Wh}/e^{Wh}, S/S or S/-)*
"Silver wheaten" male is same as silver duckwing, see description No. 3c. All areas of the female described in No. 4 as wheaten are cream. "Salmon" Faverolle is a silver wheaten with autosomal red showing through the silver. Males have black breast, body, and muffed beard. The back is brown red and the hackle and saddle is straw colored. The female is salmon pink on the back, hackle, head, wings and tail and creamy white on the breast.

4b. Blue Color Phase *(e^{Wh}/e^{Wh})*
"Blue wheaten" *(Bl/bl$^+$, s^+/s^+ or $s^+/-$)* male is the same as blue red, see description No. 3e. All areas of the female described in No. 4 as black are blue. "Splash wheaten" *(Bl/Bl, s^+/s^+ or $s^+/-$)* male is the same as red pyle, see description No. 3f. All areas of the female description in No. 4 as black are white and as wheaten are cream. "Blue silver wheaten" *(Bl/bl$^+$, S/S S/-)* male is the same as blue silver duckwing, see description No. 3e. All areas of the female described in No. 4 as black are blue.

4c. Black Tailed Color Phase *(e^{Wh}/e^{Wh}, Co/Co)*
"Black tailed buff" and "black tailed red" *(s^+/s^+ or $s^+/-$)* are either buff or chestnut red. Tail is black, wing flights are partly black and hackle feathers of black tailed red females are distinctly tipped with black. "Black tailed white" *(S/S orS/-)* is the same as black tailed buff except buff is replaced with white.

4d. Barred Color Phase *(e^{Wh}/e^{Wh}, Co/Co, B/B or B/-)*
All feathers are evenly barred.

4e. Buff Color Phase *(e^{Wh}/e^{Wh}, Co-3/Co-3, Di/Di, Cb/Cb, s^+/s^+ or $s^+/-$)* *
Entire surface, an even shade of intense, golden buff.

4f. White Color Phase *(e^{Wh}/e^{Wh}, I/I or c/c)*
Entire surface pure white.

PLUMAGE COLORS BASED ON BROWN GENE *(e^b)*

5. DARK BROWN *(e^b/e^b, s^+/s^+ or $s^+/-$)*

Color of Male. Red and black pigment distribution the same as light brown male. See light brown description, No. 3a.

Color of Female. Head is reddish bay, hackle is reddish bay striped with black. Tail is black, wing flights are black edged with brown, all other feathers are black coarsely stippled with reddish brown.

5a. Silver Color Phase *(e^b/e^b, S/S or S/-)*
Male is same as "silver", see description under No. 3c. All areas described in No. 5 as red or brown are white in both sexes.

5b. Barred Color Phases *(e^b/e^b, Db/Db, Pg/Pg)*
Plumage is evenly barred over entire body by regular parallel alternating bars with exception of hackle which is non-barred and for the basic ground color. The "Silver Campine" *(S/S or S/-)* has black and white bars and a white hackle, and the "Golden Campine"

(s^+/s^+ or $s^+/-$) has black and golden bay bars and a golden bay hackle.

5c. Penciled Color Phases *(e^b/e^b, Pg/Pg)*
"Partridge" *(s^+/s^+ or $s^+/-$)* plumage color for the male is the same as the dark brown male, see description under No. 5. The females head is deep reddish bay, hackle is black slightly penciled and laced with deep reddish bay, tail is black. All other feathers are deep reddish bay with three distinct black pencilings; the center black, then alternately deep reddish bay and black ending with a deep reddish bay edging around the entire surface. "Silver penciled" *(S/S or S/-)* is the silver counterpart of partridge. All areas that were deep reddish bay are steel gray.

5d. Columbian Color Phase *(e^b/e^b, Co/Co)*
"Columbian" or "light" *(S/S or S/-)* as in the Brahma and Sussex breeds are white except that the tail is black, hackle is black with narrow lacing of white and wing flights are black with white edging on lower web. In the "barred columbian" *(B/B or B/-, S/S or S/-)* all areas described as black in columbian are replaced by black and white parallel bars. The "buff" columbian *(s^+/s^+ or $s^+/-$)* also called just "buff" in Brahma breed is the red-buff counterpart of the columbian pattern. All areas described as white in the columbian are replaced by buff.

5e. Laced Color Phases *(e^b/e^b, Co/Co, Pg/Pg, Ml/Ml)*
"Silver laced" *(S/S or S/-)* males are black with white lacing on the head, hackle and saddle, their back and wing bows are white. In females, the head is silvery gray and the hackle is black with lacing. In both sexes, tail is black, wing flights are black with white edging and all other feathers are white with a narrow lacing of black. The "golden laced" *(s^+/s^+ or $s^+/-$)* color phase is golden bay in all those areas described as white in the silver laced. The "blue golden laced" also called "violette" or "violet laced" and the "blue silver laced" are blue color phase *(Bl/bl^+)* of the golden and silver laced. All areas described as black are blue. The "buff laced" *(Bl/Bl)* is homozygous for the blue gene causing a white lace.

5f. Mille Fleur Color Phases *(e^b/e^b, Co/Co, mo/mo)*
In the "mille fleur" *(s^+/s^+ or $s^+/-$)* pattern the males are golden bay to orange vermillion and the females are golden buff. Each feather is marked with a V-shaped bar of black near the end of the feather and the feather is tipped with a V-shaped white spangle. The "porcelain" *(lav/lav, s^+/s^+ or $s^+/-$)* pattern is the same as the mille fleur except that the red-buff areas are beige and the black areas are slaty blue. The "silver mille fleur" *(S/S or S/-)* is the silver counterpart of the mille fleur with all red-buff areas being white.

5g. Red Color Phase *(e^b/e^b, Co-3/Co-3, Mh/Mh, s^+/s^+ or $s^+/-$)* *
Entire surface an even shade of rich brilliant red.

5h. Double Laced Color Phase *(e^b/e^b, Pg/Pg, Ml/Ml)*
In the "double laced" pattern of the Barnevelder the head and tail are black and the wing flights are black edged with red-brown. In males the hackle and saddle are black edged and shafted with red-brown. All other feathers are red-brown with black lacing. In females the hackle is black, all other feathers are red-brown laced with black outer and inner lacing.

5i. White Color Phase *(e^b/e^b, I/I or c/c)*
Entire surface pure white.

PLUMAGE COLOR BASED ON BUTTERCUP GENE *(e^{bc})*

6. BUTTERCUP *(e^{bc}/e^{bc}, Db/Db, s^+/s^+ or $s^+/-$)*

Also called "golden penciled" in the Frisian breed.

Color of Male. Dorsal surface is orange red and ventral surface reddish bay. Black spangles on cape and on sides below the wings. Tail is black with bay edging or markings.

Color of Female. Plumage is golden buff, marked with parallel rows of elongated black spangles, each spangle extending slightly diagonally across the web. Head and hackle are golden buff with no markings. Tail is black with buff markings on lower web.

6a. Silver Color Phase *(e^{bc}/e^{bc}, Db/Db, S/S or S/-)*
"Silver penciled" as in the Frisian breed is the silver counterpart of the buttercup pattern, No. 6. All the red-buff areas of the buttercup are white.

6b. Barred Color Phases *(e^{bc}/e^{bc}, Db/Db, Pg/Pg)*
Called "penciled" in the Hamburg breed. The "silver penciled" *(S/S S/-)* male is white with black tail. Indistinct black barring on sides of body below wings. Wing primaries have black upper webs and secondaries have black barred upper webs. Female the same as No. 5b except black bars are narrower. The "buff penciled" and "golden penciled" *(s^+/s^+ or $s^+/-$)* patterns are the same as the silver penciled except that all white areas are buff or bright bay.

6c. White Color Phase *(e^{bc}/e^{bc}, I/I or c/c)*
Entire surface pure white.

PLUMAGE COLORS BASED ON RECESSIVE WHEATEN GENE *(e^y)*

7. DARK BLACK BREASTED RED *(e^y/e^y, s^+/s^+ or $s^+/-$)* *

Color of Male. In all dark wheaten-types, the male pigment distribution is the same as black breasted red male plumage. See distribution under No. 3.

Color of Female. "Dark black breasted red" females of the Aseel, Malay and Shamo breeds have dark brown head, hackle, tail and wings. Hackle striped with black, but no black in primaries or secondaries. Back dark cinnamon brown, body brown and breast cinnamon brown. "Dark black breasted red" female of the Cubalaya breed has reddish chestnut head and hackle, cinnamon back and wings and light cinnamon body and breast. "Brown" Sussex females have head and hackle brown striped with black. Back and wings wheaten brown, flights black, edged with brown and tail black.

7a. Laced Color Phases *(e^y/e^y, Co/Co, Pg/Pg, Ml/Ml, Mh/Mh)* *
"Blue-laced red" *(Bl/bl^+)* is rich red with each feather laced with blue. The tail of the male is blue with shafts and extreme center red. The "white-laced red" *(I/i^+)* is the same as the blue-laced red except that blue is replaced with white.

7b. Dark Double Laced Color Phases *(e^y/e^y, Pg/Pg, Ml/Ml, Mh/Mh, s^+/s^+ or $s^+/-$)* *
The "Dark" Cornish pattern is one in which the head and tail are black, hackle is black with bay or red shafts. Wing flights are black edged with bay. In males the back, saddle and wing bows are black with irregular centers of dark red, all other feathers are black. In females all other feathers are reddish mahogany laced with black outer and inner lacing. The "jubilee" *(I/i^+)* pattern is the same as the Dark Cornish pattern except that black has been replaced with white.

7c. Black Tailed Red Color Phases *(e^y/e^y, Co/Co, Mh/Mh, s^+/s^+ or $s^+/-$)* *

Feathers are intense, deep red to mahogany bay. Tail is black, wing flights are partly black and hackle feathers of females are slightly tipped with black. The "speckled" *(mo/mo)* pattern is the same as the black tailed red except that each feather ends with a white tip, a narrow V-shaped black bar divides the white from the rest of the feather. Tail feathers tipped with white.

7d. **Buff Color Phases** *(e^y/e^y, Co-3/Co-3, Di/Di, cb/cb, s^+/s^+ or $s^+/-$)* *
Entire surface an even shade of rich golden buff. The "buff laced" also known as "white laced buff" and "chamois" *(Pg/Pg, Mi/Mi, Bl/Bl)* is the same as buff with each feather laced with creamy white.

7e. **White Color Phase** *(e^y/e^y, I/I or c/c)*
Entire surface pure white.

PLUMAGE COLORS FOR WHICH THE E LOCUS GENE IS UNKNOWN

8. QUAIL *(Co/Co, Mi/Mi, s^+/s^+ or $s^+/-$)**

Color of Male. Head, hackle, back, saddle and wing shoulder fronts and bows are black laced with golden bay. Breast is beige laced with golden bay and body is light slate with brownish tint. Tail and wing primaries are black and secondaries are black edged with beige.

Color of Female. Head, hackle, back, body and wing shoulders, fronts and bows are black finely laced with yellow. Breast is beige. Tail is black with brownish tint, outer web is penciled with light brown. Wing primaries are brownish black, and secondaries are black with beige.

8a. **Blue Color Phase** *(Bl/bl^+, s^+/s^+ or $s^+/-$)*
Same color distribution as the quail pattern, No. 8, except that black is replaced with blue.

9. "LAKENVELDER" COLUMBIAN *(S/S or S/-)*

White except that head, hackle, saddle and tail are black. Wing flights are black with outer webs white.

9a. **Gold Color Phase** *(s^+/s^+ or $s^+/-$)*
All areas described as white in No. 9 are replaced by red.

9b. **Red Saddle** *(I/i^+, mo/mo, s^+/s^+ or $s^+/-$)**
Same as 9a except, black replaced by white in both sexes. Male's back, wing bows, and coverts are lustrous blood red; breast is reddish brown, tipped with small white spangles. Female's back is salmon red; wing bows, coverts, and breast is salmon red, tipped with small white spangles.

10. WHITE CRESTED BLACK *(S/S or S/-)*

Crest is white with narrow black frontal, all other feathers are black.

10a. **Blue Color Phase** *(Bl/bl^+, S/S or S/-)*
The "white crested blue" is the same as the white crested black, No. 10, except that the black feathers have been replaced with blue.

11. HALF-MOON SPANGLED *(Db/Db, Pg/Pg, Mi/Mi, s^+/s^+ or $s^+/-$)* *

Color of Male. Head and wing bows are dark red, hackle and saddle are black laced with dark red, back is red and black. Wing coverts are deep brown ending with a black half-moon- shaped spangle. Wing secondaries are black edged with brown and ending with a black half-moon-shaped spangle. All other feathers are black.

Color of Female. Head and wing fronts are brown, hackle is black laced with golden bay, tail is black. Wing primaries are black edged with brown, secondaries are black half-moon- shaped spangle. All other feathers are rich brown ending with a black half-moon shaped spangle.

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615, 617, 618, 620, 627,
634, 645, 648, 658, 668,
676, 684, 691, 702, 733,
745, 758, 761, 766, 778,
800, 803, 858, 954, 965,
983, 990, 992, 1006, 1014,
1016, 1020, 1021, 1023, 1030,
1094, 1095, 1099, 1102, 1103,
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265, 266, 267, 268, 269,
270, 271, 272, 273, 274,
275, 276, 277, 351, 469,
478, 479, 480, 481, 482,
483, 492, 496, 497, 498,
499, 500, 501, 502, 503,
504, 1128,

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427, 434, 469, 482, 610,
642, 785, 1128,

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10, 32, 33, 34, 39,
95, 96, 108, 109, 110,
122, 123, 124, 145, 146,
147, 148, 149, 317, 849,
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805, 807, 824, 834, 860,
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