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(3) AN ANNOTATED BIBLIOGRAPHY OF STUDIES ON ORGAN: BODY WEIGHT RELATIONSHIPS

by

Paul F. Robinson

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AN ANNOTATED BIBLIOGRAPHY OF STUDIES ON
ORGAN: BODY WEIGHT RELATIONSHIPS

Project No.: 4C08-02-NEW-04

APPROVED:

Douglas Lindsey

DOUGLAS LINDSEY

Colonel, MC

Director of Medical Research

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FOREWORD

The study of the organ: body weight relationships in animals is valuable in at least two respects. It will give a better insight into the nature of growth and, by establishing the limits of normal variation, mark off a base line, valuable in experimentation. In addition, the study of these relationships has been of value in detecting the more subtle effects of very small amounts of toxic material introduced into the organism over a greater or lesser period of time.

It is as a contribution to these fundamental studies that this bibliography has been assembled. A few entries are not annotated. This is because the journal was not accessible. It is presumptuous to claim that any bibliography is complete, and this one doubtless has its share of omissions, but it is hoped that they will not too greatly affect the value of this compilation as a research tool.

AN ANNOTATED BIBLIOGRAPHY OF STUDIES ON
ORGAN: BODY WEIGHT RELATIONSHIPS

1. The effect of lactation and exercise on the rate of involution of the uterus in the rat.

ABBOTT, E., and IVY, A. C. *Am. J. Physiol.* 117: 487-494, 1936. As determined by organ body-weight comparison, it was found that lactation increases the rate of involution of the uterus, whereas exercise augments this process only slightly.

2. The growth of the pituitary body in the female rabbit.

ALLANSON, M. *J. Exp. Biol.* 9: 117-123, 1932. The logarithm of the pituitary weight was plotted against the logarithm of the body weight for 48 female and 31 male rabbits.

3. Studies on the physiology of reproduction. IV. Changes in the adrenal gland of the female rat associated with the estrus cycle.

ANDERSON, D. H., and KENNEDY, H. S. *J. Physiol.* 76: 247-260, 1932. A number of differences in the relative and absolute weights of the adrenal are pointed out; the absolute body weight, as well as the estrus cycle, introduced a variable.

4. Ricerche ponderali sull'encefalo

ANDREASSI, D. *Boll. Soc. Ital. Biol. Sper.* 14: 296-298, 1933.

5. On the postnatal growth of the kidney with special reference to the number and size of the glomeruli (albino rat).

ARATAKI, M. *Am. J. Anat.* 36: 399-436, 1926. The kidney weight data, which in general agrees with that of Donaldson (1924), is used primarily to compare with the increase in size and number of glomeruli as the rat grows. The relative weight of both the right and left kidney is given.

6. Nutrition and growth.

ARON, H. Philippine J. Sciences B. Medical Sciences 6: 1-51, 1911. In the case of dogs kept in a condition of severe starvation, most of the organs retain their weight and size while the brain grows to normal weight.

7. The effects of inanition in the pregnant albino rat, with special reference to the changes in the relative weights of the various parts, systems and organs of the offspring.

BARRY, L. W. Carnegie Inst., Contrib. to Embryol. No. 53, Publ. No. 274: 91-136, 1920. The data are presented as the averages of groups and the percentage a group may vary from normal. The diet allowed these rats was whole-wheat bread soaked in whole milk.

8. Notes on the postnatal growth of the heart, kidneys, liver and spleen in man.

BEAN, R. B. Carnegie Inst., Contrib. to Embryol. No. 37, Publ. No. 272: 263-284, 1920. A compilation of 1375 cases is presented comprising white and negro children of both sexes up to the age of maturity. Unfortunately no total body weights were recorded, but a body of data as large as this should not go unnoticed.

9. Ueber den Einfluss des Hungerns auf die neugeborenen Thiere, insbesondere auf das Gewicht und die Entwicklung des Gehirns.

BECHTEREW, W. von. Neurol. Centralblatt 14: 810-817, 1895.

10. Postnatal growth in the weight of the body and of the various organs in the guinea pig.

BESSESEN, A. N., and CARLSON, H. A. Am. J. Anat. 31: 483-521, 1923. Eighty-two animals were used in this study, approximately equally divided as to sex. Groups were autopsied from birth to maturity to obtain a continuous record of development.

11. Über die Grössenverhältnisse des Herzens bei den Vögeln.
BOLLINGER, O. SB. Ges. Morphol. Physiol. München
9: 106-113, 1893.
12. Brain-weight and body-weight of mammals.
BONIN, G. von. J. Gen. Psychol. 16: 379-389, 1937.
13. The weight of the thymus gland in health and in disease.
BOYD, E. Am. J. Dis. Child. 43: 1162-1214, 1932.
This very large compilation of data on the human thymus demonstrates that not only is the variability of the thymus weight high, but that any pathological process at work in the body will reduce thymus weight rapidly.
14. Tables of the weights of the human body and internal organs, etc.
BOYD, R. Phil. Trans. Royal Soc. London 151: 1861.
15. Growth of the endocrine glands and viscera in the chick.
BRENEMAN, W. R. Endocrinology 28: 946-954, 1941.
Single-comb White Leghorn and Rhode Island Red pullets and cockerels were used in this work. Their age ranged from 5 to 30 days. The average percent of body weight was computed and tabulated for the gonads, adrenals, thyroid, pancreas and liver. Comb weight and intestine length and weight was also included.
16. Organ weights of normal rabbits. Second Paper.
BROWN, W. H., PEARCE, L., and van ALLEN, C. M.
J. Exper. Med. 43: 733-741, 1926. This paper is a follow-up of a previous work and presents the summary of all the animals used, 645 males.
17. Constitutional variation and susceptibility to disease.
BROWN, W. H. Arch. Int. Med. 44: 625-662, 1929.
No numerical data are presented in this paper, but, among other things, the author discusses organ weight changes in relation to the season of the year.

18. Normal variations of percentage weights of body organs of the albino rat with changing body weight.

CAMERON, A. T. *Am. J. Physiol.* 74: 151-157, 1925. This paper reworks some of Donaldson's figures (1924) for the author's own experimental procedures. The author's animals were fed only on bread and milk.

19. Recherches expérimentales sur l'inanition. Memoire auquel l'Académie des Sciences a décerné en 1841 le prix de physiologie expérimentale. Extrait des memoires de l'academie royale des sciences.

CHOSSAT, C. Tome 8 des savants étrangers. Paris. Imprimerie Royal 1843. There was found to be no loss in the weight of the brain in starved pigeons, although the body weight had dropped about 40 percent. Only spleen and liver lost in relative as well as absolute weight.

20. The relation of adrenal weight to body weight in mammals.

CHRISTIAN, J. J. *Science* 117: 78-80, 1953. Adrenal and body weights are tabulated for 19 species of wild animals, 3 captive species, guinea pig and man. Adrenal weight seems to be a constant power of the body weight for many species and for a wide range of body weights.

21. Effect of population size on the weights of the reproductive organs of white mice.

CHRISTIAN, J. J. *Am. J. Physiol.* 181: 477-480, 1955. There was shown to be an inverse relationship between population size and weight of preputial glands and seminal vesicles. The adrenals increased in weight when 1 to 16 animals were housed together but declined when the number of animals increased beyond this number.

22. Effect of population size on the adrenal glands and reproductive organs of male mice in populations of fixed size.

CHRISTIAN, J. J. *Am. J. Physiol.* 182: 292-300, 1955. Increases in adrenal weight were produced in albino and wild house mice in confined populations of fixed size. The sizes of the thymus, preputial glands, seminal vesicles and testes are inversely related to population size.

23. The interrelationships of the adrenal glands of mother and foetus in the rat.

CHRISTIANSON, M., and JONES, I. C. J. Endocrinol. 15: 17-42, 1957. Normal nonpregnant, pregnant and pseudo-pregnant albino rats were studied. Adult and fetal body and adrenal weights and fetal pituitary weights were tabulated.

24. Factors affecting the postnatal growth of the lung.

COHN, R. Anat. Rec. 75: 195-205, 1939. Albino male rats of the Slonaker strain were grouped according to body weight at intervals of approximately 10 grams, with a range of from 5 to 390 grams. The average heart weight and the average weight of the right and left lung were determined for each of the body weight groups.

25. Adrenal and pituitary weights in rats with reduced glucose tolerance.

COLE, V. V., and HARNED, B. K. Endocrinology 30: 146-149, 1942. Both Wistar and Yale rats of both sexes were used, ranging in weight from 100 to 440 gm.

26. The effect of pyridoxin deficiency on certain organs of the rat.

COMBRIDGE, C. Brit. J. Nutrition 10: 347-354, 1956. Rats fed a pyridoxin-deficient diet have a lower thymus weight and a higher adrenal weight, relative to their body weight, than control animals on a normal diet. The deficient diet did not affect relative spleen weight.

27. Age changes in body size, body composition and basal metabolism.

CONRAD, M. C., and MILLER, A. T., Jr. Am. J. Physiol. 186: 207-210, 1956. The interrelations of total body weight and liver, brain, heart and kidney were studied in 69 Sprague-Dawley rats ranging in age from 18 to 174 days.

28. The prenatal growth of the brain and of its parts and of the spinal cord in the dog.

CORDER, R. L., and LATIMER, H. B. J. Comp. Neur. 90: 193-212, 1949. In this paper empirical formulae are presented for the determination of the weight of the brain, the spinal cord or the four major divisions of the brain from either the body weight or the body length.

29. Brain and body weight in man: their antecedents in growth and evolution.

COUNT, E. W. Ann. N. Y. Acad. Sci. 46: 993-1122, 1947. This is an extensive and closely reasoned critique of the classical work of Dubois, Lapique and others. The author approaches the problem of the relations of brain weight to body weight from the direction of physical anthropology. Any serious student of growth would be well advised to carefully read this contribution.

30. A comparison of the energy-releasing organs of the white whale (*Delphinapterus leucas*) and the thoroughbred horse "Equipoise."

CRILE, G., and QUIRING, D. P. Growth 4: 291-298, 1940. The absolute and relative weights of the brain, thyroid, adrenals and heart are compared. Since only one animal of each of the species was used, most of the paper is a discussion of the energy relationships involved.

31. A record of the body weights and certain organ and gland weights of 3,690 animals.

CRILE, G., and QUIRING, D. P. Ohio J. Science 40: 219-259, 1940. Data are given for invertebrates, amphibia, birds, carnivores, pinnepedia, cetacea, chiroptera, edentates, fish, insectivores, primates, anthropoids, reptiles, rodents and ungulates.

32. Observations on the weight and length of the central nervous system and of the legs in bull-frogs of different sizes.

DONALDSON, H. H. J. Comp. Neur. 8: 314-335, 1898. In the bull-frog, *R. catesbiana*, the relative weight of the brain compared with that of the spinal cord decreases as the frog increases in size. Variable absorption of water by the frog has considerable effect on the weight of the spinal cord.

33. A comparison of the white rat with man in respect to the growth of the entire body.

DONALDSON, H. H. Boas Anniversary Volume, New York, 1906.

34. The nervous system of the American leopard frog, *Rana pipiens*, compared with that of the European frogs, *Rana esculenta* and *Rana temporaria* (*Fusca*).

DONALDSON, H. H. J. Comp. Neur. 18: 121-149, 1908. From the data presented *R. pipiens* has a heavier central nervous system and a heavier brain and spinal cord. The brain is also heavier in proportion to the weight of the spinal cord in the case of *R. pipiens*.

35. A comparison of the albino rat with man in respect to the growth of the brain and of the spinal cord.

DONALDSON, H. H. J. Comp. Neur. Psych. 18: 345-392, 1908. Four hundred and fifty-eight male and 215 female albino rats were used. The author found many of the growth-weight relationships of man and rat to be similar, but the intensity of growth was far greater in the rat.

36. On the relation of the body length to the body weight and to the weight of the brain and of the spinal cord in the albino rat (*Mus norvegicus* var. *albus*).

DONALDSON, H. H. J. Comp. Neur. Psych. 19: 155-167, 1909. The correlation between body weight and body length, between body length and brain weight, and between body length and the weight of the spinal cord is high.

37. On the percentage of water in the brain and in the spinal cord on the albino rat.

DONALDSON, H. H. J. Comp. Neurol. and Psychol. 20: 119-144, 1910. Between birth and maturity, the percentage of water both in the brain and in the spinal cord diminishes. Possible causes and correlations are discussed in detail.

38. Further observations on the nervous system of the American Leopard Frog (*Rana pipiens*) compared with that of the European frogs (*Rana esculenta* and *Rana temporaria*).

DONALDSON, H. H. *J. Comp. Neurol. and Psychol.* 20: 1-18, 1910. This paper extends and substantiates the observations made in 1904 and published at that time. The author feels that the work of Fubini (1881) is untrustworthy.

39. A revision of the percentage of water in the brain and in the spinal cord of the albino rat.

DONALDSON, H. H. *J. Comp. Neurol.* 27: 77-115, 1916. This paper must be read in conjunction with the preceding one, since certain revisions and explanations are entered into which are necessary for proper understanding of the earlier study.

40. A comparison of growth changes in the nervous system of the rat with corresponding changes in the nervous system of man.

DONALDSON, H. H. *Proc. Nat. Acad. Sci.* 4: 280-283, 1918. This is a brief summation of the author's previous work concerning the amount of water present in the developing brain of the rat.

41. On changes in the relative weights of the viscera and other organs from birth to maturity-- Albino rat.

DONALDSON, H. H. *Am. J. Physiol.* 67: 1-21, 1923. A general discussion.

42. The rat, data and reference tables for the albino rat and the Norway rat.

DONALDSON, H. H. *Mem. Wistar Instit. Anat. and Biol.* 2nd ed., rev., pp 1-469. 1924. This classic, while containing some material on the anatomy and physiology of this species, is largely devoted to the growth of the parts and organs of the body. It is probably the most extensive morphometric work ever undertaken on any species.

43. A comparison of the Norway rat with the albino rat in respect to body length, brain weight, spinal cord weight and the percentage of water in both the brain and the spinal cord.

DONALDSON, H. H., and HATAI, H. J. Comp. Neur. 21: 417-458, 1911. The brain and spinal cord of the albino rat have relative weights of 16 per cent and 12 per cent, respectively, less than those of the Norway rat from which it is derived.

44. On the weight of the parts of the brain and on the percentage of water in them according to brain weight and to age, in albino and wild Norway rats.

DONALDSON, H. H., and HATAI, S. J. Comp. Neurol. 53: 263-307, 1931. Both males and females of the wild and domesticated rats are included in the extensive data supplied in this study. Twelve tables and ten charts summarize the findings.

45. Observations on the weight and length of the central nervous system and of the legs in frogs of different sizes (*Rana virescens brachycephala* - Cope).

DONALDSON, H. H., and SCHOEMAKER, D. M. J. Comp. Neurol. 10: 109-132, 1900. The conclusions reached are essentially the same as in the case of *R. catesbiana*. However the comparison of brain and spinal cord weights from the heaviest frogs indicates that the female possess the heavier system.

46. The influence of pregnancy on the weight of adrenal glands in the albino rat.

DONALDSON, J. C. Am. J. Physiol. 68: 517-522, 1924. There is no increase in the weight of the adrenal glands during pregnancy and lactation of the normal, healthy albino rat.

47. Ueber die Abhängigkeit des Hirngewichtes von der Körpergrösse bei den Säugethieren.

DUBOIS, E. Arch. f. Anthropologie 25: 1-28, 1898. In reference to the equation $Y = bX^k$ that was proposed by Snell in 1891, the author of this paper makes a number of determinations of the k and b values.

48. Ueber die Abhängigkeit des Hirngewichtes von der Körpergrösse beim Menschen.

DUBOIS, E. Arch. f. Anthropologie 25: 423-441, 1898.
This paper is a continuation of the preceding one.

49. The growth of the central nervous system in the human fetus as expressed by graphic analyses and empirical formulae.

DUNN, H. L. J. Comp. Neur. 33: 405-491, 1921. This lengthy and valuable paper does not include the total body weight, but uses instead body length.

50. Growth of chick embryos.

DUYFF, J. W. Acta Neerland. Morph. Norm. Path. 2: 153-164, 1939. The wet weight of 211 chick embryos was determined. The incubation age varied from 9 to 18 days. Heart, liver and brain weights were determined. The author feels that several consecutive growth cycles exist both for the embryo as a whole and for the organs studied.

51. Weights and measurements of the parts and organs of mature inbred and crossbred guinea pigs.

EATON, O. N. Am. J. Anat. 63: 273-295, 1938.
The author found certain differences in correlation between the inbred families used and control stock. Certain other differences were not readily explained.

52. On prenatal changes in relative weights of human adrenals, thymus and thyroid gland.

EKHOLM, E., and NIEMINEVA, K. Acta paediat. 39: 67-86, 1950. This study comprises measurements of the glands of 91 fetuses ranging in weight from 24 to 2480 grams. All are said to be normal. The material was not preserved.

53. Cortex and medulla in the suprarenal glands.

ELLIOTT, T. R., and TUCKETT, I. J. Physiol. 34: 332-369, 1906. This rather confusing paper includes the adrenal weights of a number of animals in addition to those of the guinea pig.

54. Die Kephalisation der Wirbeltiere .

EXNER, R., and RUTIL, R. Annalen des naturhistorischen Museums in Wien. 62: 25-56, 1958.

55. Beiträge zur Kenntnis der Wachstumsgeschichte des Tierkörpers.

FALCK, C. P. Archiv. f. Path. anat. u. physiol. (Virchow) 7: 37-45, 1854. Little or no loss in weight of the brain and spinal cord of dogs was observed during inanition. Spleen and liver lost in absolute as well as relative weight. The eye, thyroid and kidney showed no relative weight change.

56. The weight of the pituitary gland of the male dog in relation to body weight and age, with a differential cell count of the anterior lobe.

FRANCIS, K. C., and MULLIGAN, R. M. J. Morph. 85: 141-161, 1949. The pituitary weight of 55 normal male dogs was determined. Their ages ranged from puppy to adulthood.

57. A comparison of the Wistar albino and the Long-Evans hybrid strain of the Norway rat.

FREUDENBERGER, C. F. Am. J. Anat. 50: 293-349, 1932. The Long-Evans strain exceeds the Wistar rats in all measurements except the weight of eyeballs, brain and thymus. There is no consistent sex difference.

58. Variability in body length, body weight and organ weights of the rat.

FREUDENBERGER, C. B. Anat. Rec. 56: 47-56, 1933. This study was instituted to determine whether or not a more complete diet than that used by Jackson (Am. J. Anat. 15: 1-68, 1913) in his study of variability of the body and organs of the albino rat would affect the variability. Much lower coefficients of variability were found in the present work. The causes are discussed.

59. Le foie des mammiferes hibernants anatomie et histologie.

FRIANT, M. Acta Anata. 39: 209-219, 1959. In a study of the livers of some hibernating animals, the author gives liver and body weights for the following: *Vulpes velox*, *Nyctereutes procyonoides*, *sciurus* (*Heterosciurus*) *Finlaysonii*, and *Citellus*.

60. Quantitative Untersuchungen an äthiopischen Säugetieren.
I. Absolute und relative Gewichte von Herz. Leber. Milz und Nieren.

FRICK, H. Anat. Anzeig. 104: 305-333, 1957. Data is presented on 14 mammals, in both relative and absolute form. The author's concept of the somatic exponent is applied and discussed.

61. Betrachtungen über die Beziehungen zwischen Körpergewicht und Organgewicht.

FRICK, H. Zeit. f. Säug. 22: 193-207, 1957. This report is a discussion of the conditions necessary for the quantitative investigation of mammalian organs. Methods are described for calculating the somatic exponent (a-value).

62. The sign of Babinski. A Study of the Evolution of Cortical Dominance in Primates.

FULTON, J. F., and KELLER, A. D. C. C. Thomas. Springfield, Ill. 1932. A table is presented of brain and body weights for long-tailed monkeys (*lithecus rhesus*), baboons and chimpanzees of both sexes and various ages. These animals were in the collection of the Laboratory of Physiology at Yale University.

63. Quantitative observations on the brain of bony fishes with special reference to its relative growth.

GEIGER, W. Acta Anatomica 26: 121-163, 1956. In 14 species of bony fishes it is shown that the increase in weight of the brain and its parts is a function of the growth of the body as a whole and that its growth follows the law of simple allometry. Brain weight seems to be related to the ecology and activity of the species and not to its phylogenetic position.

64. Effects of low atmospheric pressures on the activity of the thyroid, reproductive system and anterior lobe of the pituitary in the rat.

GORDON, A. S., TORNETTA, F. J., D'ANGELO, S. A., and CHARIPPER, H. A. *Endocrinology* 33: 366-383, 1943. Both male and female adults were exposed to atmospheric pressures of 280-250 mm Hg for varying periods of time.

65. A first study of the weight variability and correlation of the human viscera with special reference to the healthy and diseased heart.

GREENWOOD, M. *Biometrika* 3: 63-83, 1904. While body weights are not given, this is a useful paper and of historical interest.

66. A second study of the weight, variability and correlation of the human viscera.

GREENWOOD, M., and BROWN, J. W. *Biometrika* 9: 473-485, 1913. A revision and extension of the earlier paper (1904).

67. On the relationship of organ weight, function and body weight.

GUERRA, E., and GUNTHER, B. *Acta physiol. latino-americana* 7: 1-7, 1956. This paper postulates that the rules of biological similarity can be applied to isolated organs and that any function can be expressed in relation to organ weight and body weight.

68. Maternal environment and fetal development in the pig.

HAFEZ, E. S. E., MAUER, R. E., and ENSMINGER, M. E. *Growth* 22: 269-289, 1958. The weights of the various organs were tabulated for the 60 day and 100 day fetus, for the newborn, and for the adult animal.

69. Influence of long-term exposure to adverse environments on organ weights and histology.

HALE, H. B., MEFFERD, R. B. Jr., VAWTER, G., FOERSTER, G. E., and CRISCUOLO, D. *Am. J. Physiol.* 196: 520-524, 1959. Rats were exposed to heat, cold and simulated altitude for periods of 24 weeks. For liver,

heart and kidney, adjusted weights indicated temperature dependency. Pressure dependency was established only for liver and kidney.

70. Relation of kidney weight to body weight in the cat.

HALL, V. E., and MacGREGOR, W. W. Anat. Rec. 69: 319-331, 1937. Fifty male and fifty female cats were used, varying in size from 110 gm to 5.04 kg. The author feels that the concept of the kidney weight being proportional to the body surface is not entirely valid.

71. Über Wachstum und Rückgang, über Standardisierung, Individualisierung und bauliche Individualtypen im Laufe des normalen Postfötallebens. Konstitutionsanatomische Studien an Kaninchen.

HAMMAR, J. A. Zchtr. f. Mic-Anat. Fors. 29: 1-540, 1932. This large and extensive work, with its 132 tables and 48 charts, deals with the correlations to be found between the organ weights and the particular growth stage of the animal. Interrelationships of the organs are also considered as regards their growth and variations from a given norm. The lymphoid and endocrine organs are those given the most consideration. The nervous system is not discussed.

Readers wishing a condensation of this lengthy work may consult Biological Abstracts 9: 1710.

72. A biometrical study of the size inter-relationships of the glands of internal secretion.

HAMMETT, F. S. J. Metabolic Res. 7-8: 91-163, 1925. This biometrical study was made of the weight inter-relationships of the endocrine glands in a group of 121 male and 121 female albino rats 150 days old. A considerable portion of the paper is given to a discussion of the statistical methods used and their meanings.

73. The brain weight of birds.

HANCOCK, J. L. Amer. Naturalist 24: 969, 1890.

74. Cardiac and pectoral muscles of trochilids.

HARTMAN, F. A. Auk 71: 467-469, 1954. Heart weights were obtained on 84 specimens of 22 species. Fresh tissue was used and reported as percent of body weight.

75. Heart weight in birds.

HARTMAN, F. A. Condor 57: 221-238, 1955.

76. Liver lipides in hummingbirds.

HARTMAN, F. A., and BROWNELL, K. A. Condor 61: 270-271, 1959. A diurnal cycle in liver weights was observed in warblers as well as hummingbirds. Some comparisons are made with other families of birds.

77. The effect of partial starvation on the brain of the white rat.

HATAI, S. Am. J. Physiol. 12: 116-127, 1904. There was a loss of about 6 per cent in the brain weight of the young male rats fed on fat and starch, but the female lost only about half as much.

78. Preliminary note on the size and condition of the central nervous system in albino rats experimentally stunted.

HATAI, S. J. Comp. Neur. 18: 151-155, 1908. The normal relation between the body and brain weights were not disturbed by stunting the normal growth by means of underfeeding.

79. On the weights of the abdominal and the thoracic viscera, the sex glands, ductless glands and the eyeballs of the albino rat (*Mus norvegicus albinus*) according to body weight.

HATAI, S. Am. J. Anat. 15: 87-119, 1913. This data is presented fully in tables and graphs along with a critique of factors that have some influence on such a study.

80. On the weight of the thymus gland of the albino rat (*Mus norvegicus albinus*) according to age.

HATAI, S. *Am. J. Anat.* 16: 251-257, 1914. The weight of the thymus is highly variable since it is correlated with the age and not the weight of the rat. It also involutes about 85 days after birth.

81. On the weight of some of the ductless glands of the Norway and of the Albino rat according to sex and variety.

HATAI, S. *Anat. Rec.* 8: 511-523, 1914. The glands dealt with are the adrenals, pituitary, thymus, thyroid, testes and ovaries.

82. On the influence of exercise on the growth of organs in the albino rat.

HATAI, S. *Anat. Rec.* 9: 647-665, 1915. Most of the organs show modifications as the result of exercising in a revolving cage. Sexual differences are apparent. In the exercised rats the heart weight and amount of exercise taken are highly correlated.

83. The growth of the body and organs in albino rats fed with a lipid-free ration.

HATAI, S. *Anat. Rec.* 9: 1-20, 1915. There is a reduction in the weight of the central nervous system as the result of the lipid-free ration, as well as a much greater reduction in the ovary and testicle. Figures are given for the other organs.

84. Metabolic activity of the nervous system. II. The partition of nonprotein nitrogen in the brain of the gray snapper (*Neomaenid griseus*) and also the brain weight in relation to the body length of this fish.

HATAI, S. *J. Comp. Neur.* 29: 41-59, 1918. Observations were made on the brain weights of 74 gray snappers of various sizes; body weights were obtained on 20. The relation between brain weight and body length seemed to be linear.

85. Pituitary and adrenal weight in protein-deficient and in starving rats.

HELLER, H. J. *Endocrinol.* 7: XXVI, 1950. In general both the wet and dry weight of the pituitaries and adrenals increase in relation to body weight in starving and in protein-deficient rats.

86. Relation of gland weights to growth and aging processes in rats exposed to certain environmental conditions.

HERRINGTON, L. P., and NELBACH, J. H. *Endocrinology* 30: 375-386, 1942. This paper is a more complete report of work published in 1939 and 1940, wherein the effect of high and low temperatures and other adverse environmental conditions were studied.

87. Das Herzgewicht der Wirbeltiere.

HESSE, R. *Zool. Jahrb.* 38: 243-364, 1921. Relative weights are tabulated for many species of fish, reptiles, amphibians and mammals; and comparisons are made with the data of earlier investigators.

88. Morphologische Untersuchung des Gehirns bei den japanischen Zwillingsfeten; 1. Mitteilung.

HIGETA, K. *Okajimas Folia Anat. Japan.* 19: 97-112, 1940.

89. Variations in weight of some internal organs of the domestic fowl.

HOPKINS, J. W., and BIELY, J. *Canadian J. Res.* 12: 651-656, 1935. One hundred normal yearling single-comb White Leghorn hens were examined. Liver, kidneys and spleen were weighed. There was a significant correlation between the weight of the liver and kidneys from birds of a specified total weight, but no correlation between kidney and spleen weight.

90. The growth of the body and organs of the albino rat as affected by feeding various ductless glands (thyroid, thymus, hypophysis and pineal).

HOSKINS, E. R. J. Exp. Zool. 21: 295-346, 1916.
There was no evident effect upon the growth rate of the body or organs of albino rats after feeding thymus, hypophysis or pineal gland. Thyroid feeding did produce hypertrophy of some organs. This paper reviews the early literature dealing with changes induced in animals fed ductless glands. 64 references.

91. Adrenal gland weights of Hereford and Brahman cattle.

HOWES, J. R., HENTGES, J. F., and WARNICK, A. C. Proc. Soc. Exp. Biol. and Med. 104: 322-324, 1960.
Weights of individual and paired adrenals together with adrenal-body weight ratios for male, female and castrated Hereford and Brahman cattle are presented in this paper.

92. Brain weights in vertebrates.

HRDLICKA, A. Smith. Misc. Coll. 48: 89-112, 1907. A large number of brain weights are given for many species of mammals and birds. These are arranged both according to species and by average of relative brain weight. The bibliography contains references to some of the older works that mention the relationship of brain weight to body weight.

93. Weight of the brain and of the internal organs in American monkeys.

HRDLICKA, A. Am. J. Phys. Anthropol. 8: 201-211, 1925.
A considerable amount of data is presented in this paper, although some of it is rather confused in form. Brain weights are given for other apes, some of this material being taken from the author's "Brain Weights in Vertebrates" published in the Smithsonian Miscellaneous Collection XLVIII. 1905.

94. The endocrine weights of primates.

INAY, M., RUCH, T. C., FINAN, S., and FULTON, J. F. *Endocrinology* 27: 58-67, 1940. Fifty macaques, 7 manglebeys and 17 chimpanzees were used in this study. The data are considered from the point of view of variability, sex differences and species differences. The variability of individuals within a sex and species category is considerable.

95. Effect of diet in rats on adrenal weights and on survival following adrenalectomy.

INGLE, D. J., GINTHER, G. B., and NEZAMIS, J. *Endocrinology* 32: 410-414, 1943. Male rats of the Sprague-Dawley strain were used, and the weight group of 180-182 gm utilized for all experiments.

96. On the prenatal growth of the human body and the relative growth of the various organs and parts.

JACKSON, C. M. *Am. J. Anat.* 9: 119-165, 1909. This paper summarizes all the data available at that time on the relative size of the internal organs of the human embryo. Data from his own material, and probably from the sources quoted, were gathered from preserved specimens.

97. Postnatal growth and variability of the body and of the various organs in the albino rat.

JACKSON, C. M. *Am. J. Anat.* 15: 1-68, 1913. This extensive and valuable paper is chiefly concerned with variability in body weight and its dependence upon the variability of its component parts.

98. Changes in the relative weights of the various parts, systems and organs of young albino rats held at constant body-weight by underfeeding for various periods.

JACKSON, C. M. *J. Exper. Zool.* 19: 99-156, 1915. All the principal organs were observed and their relative and absolute changes described.

99. Effect of acute and chronic inanition upon the relative weights of the various organs and systems of adult albino rats.

JACKSON, C. M. *Am. J. Anat.* 18: 75-116, 1915. The adrenals, thyroid, eyeballs, spinal cord and brain during a period of inanition lose very little in absolute weight. The kidneys, heart, lung, hypophysis and testes lose in proportion to the entire body. The spleen, liver and gut lose more than the whole body. This paper contains a number of references to the early literature on organ body weight changes during starvation.

100. On the relative growth of the component parts (head, trunk and extremities) and systems (skin, skeleton, musculature and viscera) of the albino rat.

JACKSON, C. M., and LOWRY, L. G. *Anat. Rec.* 6; 449-474, 1912. The internal organs were weighed as a unit in this study. The ages ranged from newborn to one year, with both sexes being represented.

101. Heart weights of North American crows and ravens.

JOHNSON, D. W., and WILLIAMSON, F. S. L. *Wilson Bull.* 72: 248-252, 1960. Body weights, heart weights and the ratio between the two are given for 65 North American crows and ravens. Data are presented for both adult and first-year birds of both sexes.

102. L'involution physiologique de la bourse de Fabricius et ses relations avec l'apparition de la maturité sexuelle.

JOLLY, J. *Compt. Rend. Soc. Biol.* 2: 638-640, 1913. Measurements were made of the weights of the bursa, thymus and testes of chicks from 2 to 12 months of age. The weight of the bursa seems to be related to the development of sexual maturity.

103. Studien über die Thymusinvolution. Die akzidentelle Involution bei Hunger.

JONSON, A. *Arch. f. mikr. Anat.* 73: 390-443, 1909. In a series of 10 young rabbits kept at a constant body-weight for 4 weeks, the weight of the thymus was reduced to one-thirtieth of its initial value.

104. The ratio between the heart weight and body weight in various mammals.

JOSEPH, D. R. J. Exper. Med. 10: 521-528, 1908. Considerable numbers of dogs, cats, rabbits and guinea pigs of both sexes are reported on, but no attempt has been made to correlate the weights observed with the ages of the animals.

105. The relative weight of the brain cortex in human races and in some animals and the asymmetry of the hemispheres.

KAPPERS, C. U. A. J. Nerve and Mental Dis. 64: 113-124, 1926. Data are presented for a small number of European and Chinese subjects taken at postmortem. This is compared with figures given by other authors.

106. The relation of the cerebellum weight to the total brain weight in human races and in some animals.

KAPPERS, C. U. A. J. Nerve and Mental Dis. 65: 113-124, 1927. The material discussed is a small series of Dutch, Chinese and Japanese brains. Data on various species of mammals are introduced. As in the preceding paper there are a number of references to the older European literature.

107. Recherches sur la croissance du corps et des organes du pigeon.

KAUFMAN, L. Biol. Gen. 3: 105-125, 1927. The weights and measurements are recorded every other day from hatching to four weeks, again at 3 months, and finally for "old" animals. Growth graphs are included, plotted on a linear scale.

108. Influence of diet composition on caloric requirements, water intake and organ weights of rats during restricted food intake.

KAUNITZ, H., SLANETZ, C. A., JOHNSON, R. E., and GUILMAIN, J. J. Nutrition 60: 221-228, 1956. The adrenal, renal and testicular weights varied significantly in rats kept on high-fat, high-carbohydrate and high-protein diets. The body weight of these animals was kept constant by restricted feeding.

109. On the relative growth of the organs and parts of the embryonic and young dogfish (*Mustelus canis*).

KEARNEY, H. L. *Anat. Rec.* 8: 271-297, 1914. Forty-seven dogfish, ranging in weight from less than a gram to 1.5 kilograms, and about equally divided in numbers as to sex, were dissected and the various organs and tissues measured and weighed. The larger specimens were preserved in 5 per cent formalin.

110. The growth of brain in men and monkeys with a short criticism of the usual method of stating brain ratios.

KEITH, A. J. *Anat. Physiol.* 29: 282-303, 1895. This paper contains many measurements of brain weights by many observers. The information presented in this way may be imperfect, but it is of value, as are the accompanying references to the older literature.

111. The growth of the brain and viscera in the smooth dog-fish (*Mustelus canis*, Mitchell).

KELLCOTT, W. E. *Am. J. Anat.* 8: 319-353, 1908. The brain, heart, rectal gland, pancreas, spleen, liver and gonads were weighed in a series of 315 dogfish including specimens from birth to maturity. Comparisons are made with other vertebrates.

112. Findings in 216 routine autopsies of *Macaca mulatta*.

KENNARD, M. A., and WILLNER, M. D. *Endocrinology* 28: 955-966, 1941. Complete autopsies were made on 118 of these animals, 66 of which were classified as healthy and the remaining 52 as unhealthy. The effect of sex, weight and health on the weights of the brain, endocrines and visceral organs are presented and analysed with particular attention to a group of 103 immature animals weighing between 1,000 and 4,500 gm.

113. Findings at autopsies of seventy anthropoid apes.

KENNARD, M. A., and WILLNER, M. D. *Endocrinology* 28: 967-976, 1941. Data are presented for 58 chimpanzees, 4 orangutans, 3 gorillas and 5 gibbons. About half of these animals were in good health and could be considered normal. Weights are given for most of the organs, brain and endocrines and comparisons are made as to sex, age and health.

114. Weights of brains and organs of 132 new and old world monkeys.

KENNARD, M. A., and WILLNER, M. D. *Endocrinology* 28: 977-984, 1941. Complete autopsies were made on 17 sooty manglebeys, 1 brown manglebey, 1 Java monkey (*Macaca irus*), 1 hybrid (*M. mulatta* x *M. irus*) and 2 tarsius. Brain weights are supplied for a variety of other monkeys, both new and old world.

115. Gonad, adrenal and thyroid weights in golden hamsters.

KENT, G. C. Jr., and OOSTA, R. J. *Proc. Louisiana Acad. Sci.* 21: 55-63, 1958. The glands of 65 females and 69 males were weighed immediately after the animals were killed with ether. There seemed to be a seasonal effect upon the weights of the testes and thyroid.

116. Pituitary weight in growing New Zealand white rabbits in relation to live weight.

KIBLER, H. H., BERGMAN, A. J., and TURNER, C. W. *Endocrinology* 31: 59-62, 1942. The data is presented for 328 male and 370 female New Zealand white rabbits and plotted in logarithmic form.

117. Relation of certain endocrine glands to body weight in growing and mature New Zealand white rabbits.

KIBLER, H. H., BERGMAN, A. J., and TURNER, C. W. *Endocrinology* 33: 250-256, 1943. The thyroid, adrenals and gonads of 320 male and 362 female animals were weighed and equated to the body weight.

118. Quantitative Untersuchungen an äthiopischen Säugetieren.
II Absolute und relative Gewichte der Hoden äthiopischen Affen.

KINSKY, M. Anat. Anz. 108: 65-82, 1960.

119. Zur Methodik vergleichender metrischer Untersuchungen,
besonders des Herzgewichtes.

KLATT, B. Biol. Zentralbl. 39: 406-421, 1919. The author applies the classic equation $Y = bX^k$ to heart-body weight data. Some of these data are his own, some borrowed from other papers.

120. Mittheilungen über die Länge und Schwere einiger Organe bei Primaten.

KOHLBRUGGE, J. H. F. Zeitschr. f. Morph. u. Anthrop. 2: 43-55, 1900.

121. Body size as a factor in interpreting the effect of hormone injections in baby chicks.

KOSIN, I. L. Am. J. Physiol. 129: 283-288, 1940. The gonad, oviduct and bursa weights were recorded from single-comb White Leghorns and Barred Plymouth Rocks, aged 17 days. Organ weights, body weights and breeds were correlated.

122. Observations on the fish population of a lake contaminated by radioactive wastes.

KRUMHOLZ, L. A. Bull. Am. Museum Nat. His. Vol. 110, Article 4, pages 283-367, 1956. The average percentages are given for the organs and other tissues of eight species of freshwater fishes: bluegills, black and white crappies, large-mouth bass, carp, bullhead, redhorse, and gizzard shad.

123. Relative weights of some viscera in the Atlantic Marlins.

KRUMHOLZ, L. A. Bull. Amer. Mus. Nat. Hist. 114: 402-405, 1958. The weights of some of the organs of 42 white marlin and 3 blue marlin are reported as minimum, average and maximum percentages of the total body weight.

124. Stomach contents and organ weights of some bluefin tuna. *Thunnus thynnus* (Linnaeus) near Bimini, Bahamas.

KRUMHOLZ, L. A. *Zoologica* 44: 127-131, 1959. Seven tuna are reported on, 5 males and 2 females. The organ weights are reported as percentage of total body weight for 6 of these animals. A comparison of the relative organ weights of the tuna is made with the relative organ weights of 10 other fishes, both fresh water and marine.

125. Studies on the Creeper fowl. XII. Size of body, organs and long bones of late homozygous Creeper embryos.

LANDAUER, W. Storrs Agr. Exp. Station, Bull. 232, 66 pp. 1939. Embryos that had been preserved in formaldehyde were used in this study. The eyes, heart, spleen, liver and gizzard were weighed and compared with normal controls and heterozygous Creepers. The data are presented in 78 short tables.

126. Studies on the lethal mutation of Cornish fowl. Growth in length of the long bones and increase in weight of the body and of some organs.

LANDAUER, W. Storrs Agr. Exp. Station, Bull. 233, 45 pp. 1939. The material was treated as in the preceding study. A comparison of the results is made with those obtained in heterozygous and homozygous Creeper embryos. This is presented in 54 short tables.

127. Studies on the endocrine glands of Frizzle fowl.

LANDAUER, W., and ABERLE, S. D. *Am. J. Anat.* 57: 99-134, 1935. A comparative study of the weights of the thyroid, adrenals, hypophysis and gonads of Frizzle and normal chickens at the age of 8 months. The normal controls were single comb White Leghorn chickens. Frizzle fowl have numerous morphological and physiological abnormalities.

128. Sur la relation du poids de l'encéphale au poids du corps.

LAPICQUE, L. Compt. rend. de biol., dix sér. 62-63, 1898. This work was done by the author at the same time that Dubois was carrying out his determinations of the k power and b constant in Snell's equation, $Y = bX^k$. The results were essentially the same, although neither knew at the time of the other's efforts.

129. Zur Lehre von der Veränderung des Gewichts und der zelligen Elemente einiger Organe und Gewebe in verschiedenen Perioden des vollständigen Hungerns.

LASAREW, N. Dissertation. Warschau. 1895. There was no loss of weight in the brain or spinal cord of the guinea pig during starvation. However, there was an absolute as well as a relative drop in the weight of liver and spleen.

130. The weights of the viscera of the common frog.

LATIMER, H. B. Anat. Rec. 18: 35-46, 1920. Fifty-nine frogs were used (*Rana pipiens*), half of which were preserved in formalin and half of which were fresh. The two different states of the animals are provided for by separate tabulations.

130a. The weights of the viscera of the turtle.

LATIMER, H. B. Anat. Rec. 19: 347-360, 1920. Material used in this study consisted chiefly of 21 male and 1 female *Chrysemys elegans*. Correlations are made among the turtles and between the turtle and the frog.

131. The weight of the brain, of its parts and of the spinal cord of the frog, turtle and dog.

LATIMER, H. B. J. Comp. Neurol. 38: 49-71, 1924. Thirty frogs, 21 male turtles and 11 dogs of random breed and size were used.

132. Postnatal growth of the body, systems and organs of the single-comb White Leghorn chicken.

LATIMER, H. B. Jour. Ag. Research 29: 363-397, 1924. This was probably the first comprehensive study made on the postnatal development of the fowl. Graphs and empirical equations present the findings, and point up the many divergences from the mammalian growth pattern.

133. The postnatal growth of the central nervous system of the chicken.

LATIMER, H. B. J. Comp. Neurol. 38: 251-297, 1925. One hundred leghorn chickens were used, ranging in age from 1 day to 300 days of age. The four divisions of the brain were weighed and the spinal cord was weighed.

134. The relative postnatal growth of the systems and organs of the chicken.

LATIMER, H. B. Anat. Rec. 31: 233-253, 1925. Absolute weights are not given for the systems and organs discussed. They are expressed in terms of percentage weights and ratios.

135. Correlations of the weights and lengths of the body, systems and organs of the turkey hen.

LATIMER, H. B. Anat. Rec. 35: 365-377, 1927. These correlations refer to a previous paper (1926) wherein 12 adult bronze hens were described.

136. Growth changes in the body and some of the organs of the chick at time of hatching.

LATIMER, H. B. Anat. Rec. 39: 215-228, 1928. The absolute and percentage weights of the body, brain, heart, gizzard, liver, lungs, eyeballs, spleen and kidneys are given graphically for 100 white leghorn chickens.

137. Prenatal growth of the cat. IV. Growth in length and weight of the digestive tube.

LATIMER, H. B. Anat. Rec. 60: 23-41, 1934. Empirical formulae are given whereby the weight of the digestive tube or of its divisions may be derived from the body weight, within given limits. Two hundred twenty-six fetuses and 35 newborn kittens were used in this study.

138. The prenatal growth of the cat. V. The ponderal growth of the liver and pancreas.

LATIMER, H. B. Scritti biologici 9: 313-322, 1934.

139. The weights and linear measurements of the digestive system of the adult cat.

LATIMER, H. B. Anat. Rec. 68: 469-480, 1937. A total of 104 animals were used, equally divided as to sex. Correlations are given between the weight and length of the body and the weights and lengths of the digestive system and of its parts.

140. The prenatal growth of the cat. VII. The growth of the brain and of its parts, the spinal cord and the eyeballs.

LATIMER, H. B. J. Comp. Neurol. 68: 381-394, 1938. 229 fetuses and 35 newborn kittens were used in this study. The weight range was from 0.300 to 197.3 gm. Empirical formulae are given for the weights of the brain, spinal cord, eyeballs, prosencephalon, mesencephalon, cerebellum and the medulla, plotted on both body weight and body length.

141. The weights of the brain and of its parts, of the spinal cord and of the eyeballs in the adult cat.

LATIMER, H. B. J. Comp. Neurol. 68: 395-404, 1938. 52 adult male and 52 adult female animals were used and weights, averages, coefficients of variation and correlations derived from the data.

142. The prenatal growth of the cat. VIII. The weights of the kidneys, bladder, gonads and uterus, with weights of the adult organs.

LATIMER, H. B. Growth 3: 89-108, 1939. If either the body weight or body length is known, the weight of any one of the four organs of the fetal urogenital system may be determined from empirical formulae given in this paper. The average weights, both relative and absolute, are given for the adult organs.

143. The prenatal growth of the cat. IX. The ponderal growth of the hypophysis, thyroid, thymus and suprarenal glands.

LATIMER, H. B. Growth 3: 337-346, 1939. Empirical formulae are given from which the weights of the hypophysis, thyroid, thymus and both adrenal glands may be determined if either the body weight or body length is known. The average percentage weight and the average absolute weight of the adult male hypophysis, thyroid and adrenal glands are shown in the figures for comparison.

144. The weights of the hypophysis, thyroid and suprarenals in the adult cat.

LATIMER, H. B. Growth 3: 435-445, 1939. Fifty-two male and 52 female cats were used in this study. Tables are given showing the absolute and percentage weights of the glands. Empirical formulae enable the weights of the three glands to be computed from the body weight.

145. The prenatal growth of the cat. X. The weight of the spleen in the fetal period and in the adult.

LATIMER, H. B. Growth 4: 259-265, 1940. Empirical formulae are given for the determination of the spleen weight from either body weight or body length in either male or female cats.

146. Empirical formulae for the measurements of the central nervous system and of the digestive system in the adult cat.

LATIMER, H. B. Growth 4: 267-276, 1940. Empirical formulae are presented for the more accurate determination of the weights of the brain and of its four major divisions, of the pairs of eyeballs, and of the spinal cord; also for the weights of the digestive tube and of its four divisions, of the liver and of the pancreas.

147. The weight of the hypophysis in the dog.

LATIMER, H. B. Growth 5: 293-300, 1941. Empirical formulae are given for computing the weight of the hypophysis from either the body weight or the body length for dogs of either sex.

148. The weights of the brain and of its parts, and the weight and length of the spinal cord in the dog.

LATIMER, H. B. Growth 6: 39-57, 1942. One hundred sixty-two male and 159 female adult dogs are reported upon. The averages, coefficients of variation and significant ratios are given for the seven divisions of the brain, for the weight and length of the cord and for the body weight and body length.

149. The prenatal growth of the cat. XII. The weight of the heart in the fetal and in the adult cat.

LATIMER, H. B. Growth 6: 341-349, 1942. This study is based on 229 fetal and 35 new-born cats, which had been preserved in formalin, and 104 freshly killed cats. Empirical formulae are given by means of which the weight of the heart may be estimated from either body weight or body length in the fetal or adult cat.

150. The prenatal growth of the Cat. XIII. The weights of the lungs, trachea and larynx in the fetal and in the adult cat.

LATIMER, H. B. Growth 7: 239-250, 1943. The growth of the lungs, trachea and larynx during the first part of the fetal period proceeds at a different rate than during the latter part of the fetal period to maturity. Empirical formulae are given for each of these periods.

151. The relative weights of the major divisions of the brain and the cord in several species of animals.

LATIMER, H. B. Univ. of Kan. Sci. Bull, 31: pt. 1: 211-221, 1946. The weights of the prosencephalon, mesencephalon, the cerebellum and the medulla, expressed as percentages of the entire brain weight, are assembled for the frog, chicken (both newly hatched and adult), albino rat, turtle, cat (fetal, newborn and adult), dog and man.

152. Correlations of organ weights with body weight, body length, and other weights in the adult cat.

LATIMER, H. B. Growth 11: 61-75, 1947. The integument, skeleton and musculature, as well as most of the internal organs are correlated with body weight and length. The four organs or systems best correlated with the body weight in both sexes are the musculature, integument, heart and kidneys.

153. The prenatal growth of the cat. XVI. Changes in the relative weights of the organs.

LATIMER, H. B. Growth 12: 123-144, 1948. The organs examined are arranged in four groups based on their changes relative to their adult percentage weight.

154. The prenatal growth of the heart and lungs in the dog.

LATIMER, H. B. Anat. Rec. 104: 287-298, 1949. The hearts and lungs from 156 fetal and 24 newborn dogs were used. The organs were preserved in formalin. Formulae are presented so that the weight of the heart or lungs may be determined from either the body weight or body length.

155. The weights of the brain and of its parts and the weight and length of the spinal cord in the adult male guinea pig.

LATIMER, H. B. J. Comp. Neurol. 93: 37-52, 1950. Correlations were made between 4 major divisions of the brain, the total weight of the brain, body weight and body length and the weight and length of the spinal cord of 100 animals.

156. The weight of the eyeballs in the guinea pig.

LATIMER, H. B. Anat. Rec. 110: 349-357, 1951. The eyes of 100 young adult males were used and the results correlated with other dimensions.

157. Weights, percentage weights and correlations of the endocrine glands of the adult male guinea pig

LATIMER, H. B. Anat. Rec. 111: 299-315, 1951. The hypophysis, thyroid, suprarenals and testes were weighed in 100 young adults and correlated with the weight of the brain and its parts, body weight and length, spinal cord weight and length, and eyeball weight.

158. Weights of the ventricular walls in the heart of the adult dog.

LATIMER, H. B. Anat. Rec. 113: 607, 1952. The weight of either ventricular wall is significantly correlated with body weight in the dog.

159. Weights of the right and left ventricular walls in the guinea pig heart.

LATIMER, H. B. Anat. Rec. 113: 247-252, 1952. It was found that in a series of 64 adult male guinea pigs, ranging from 413 to 918 gm in body weight, there is a significant correlation between the left ventricular wall and the total body weight.

160. The growth of the digestive system in the fetal dog.

LATIMER, H. B., and CORDER, R. L. Growth 12: 285-309, 1948. The digestive systems of 140 fetal and newborn puppies were studied. Twenty-four of the total were newly born. All of the animals were preserved in 10 percent formalin before dissection and weighing.

161. The variability in the gross body weight and the weights of the liver, feathers, and blood of 131 chickens.

LATIMER, H. B., and PEDERSON, L. T. Poultry Sci. 3: 11-14, 1923.

162. A quantitative study of the anatomy of the turkey hen.

LATIMER, H. B., and ROSENBAUM, J. A. Anat. Rec. 34: 15-23, 1926. Twelve adult bronze birds were used. The absolute and percentage weights are given for parts of the skeleton as well as the organs. Comparison is made with the chicken.

163. The weight of the brain, of its parts and the weight and length of the spinal cord in the rabbit (Race X).

LATIMER, H. B., and SAWIN, P. B. *J. Comp. Neurol.* 103: 513-539, 1955. Empirical formulae are given for estimating the weight of the brain or any of its four parts, i. e., prosencephalon, mesencephalon, cerebellum and medulla, from either gross body weight or body length. Similar formulae are presented for the weight and length of the cord.

164. Morphogenetic studies of the rabbit. XII. Organ size in relation to body weights in adults of small sized race X.

LATIMER, H. B., and SAWIN, P. B. *Anat. Rec.* 123: 81-102, 1955. Three linear and 30 ponderal measurements were made on 50 male and 50 female rabbits varying in age from 5 months to over 2 years. The female body weight is 17 per cent greater than the male and also more variable. Empirical formulae are given for estimating the dimensions of the organs and parts of the animals of either sex from gross body weight and also estimating the weights or lengths of the various parts and organs from body length.

165. Morphogenetic studies of the rabbit. XIII. The influence of the dwarf gene upon organ size and variability in race X.

LATIMER, H. B., and SAWIN, P. B. *Anat. Rec.* 123: 447-466, 1955. The organ weights and body organ-weight ratios of thirty-five adult rabbits of race X carrying the dwarf gene in the heterozygous condition are compared with 65 normals of the same race.

166. Morphogenetic studies of the rabbit. XV. Measurements of the digestive tube and of its parts in normal and dwarf rabbits of race X.

LATIMER, H. B., and SAWIN, P. B. *Anat. Rec.* 129: 1-16, 1957. Tables are given for weights, lengths and percentage weights of the digestive tube in normal and dwarf rabbits of both sexes.

167. Morphogenetic studies of the rabbit. XIX. Organ size in relation to body size in large race III and in small race X.

LATIMER, H. B., and SAWIN, P. B. Anat. Rec. 129: 457-472, 1957. Many correlations are made between these two races to show differences in body size, body build, and in the relative proportions of some of the organs.

168. Morphogenetic studies of the rabbit. XXIV. The weight and thickness of the ventricular walls in the rabbit heart.

LATIMER, H. B., and SAWIN, P. B. Anat. Rec. 135: 141-147, 1959. The weight and thickness of the right and left ventricular walls were measured in 65 large race III rabbits and 65 normal and 35 heterozygous dwarf rabbits of small race X. Ratios were derived from these measurements. Comparison is made with similar ratios for man and for other animals.

169. Normal endocrine gland weights of female rats of the Sprague-Dawley strain throughout the growth period and adult life.

LAWSON, H. D., GOLDEN, J. B., and SEVRINGHAUS, E. L. Endocrinology 31: 46-52, 1942. The period covered was 14 days to 40 weeks. Two hundred and thirty-four rats were used. The organs weighed were kidney, pituitary, thyroid, thymus, adrenal, ovary and uterus.

170. Distribution of body weight in the organs and tissues of the rabbit.

LEVINE, C. J., MANN, W., HODGE, H. C., ARIEL, I., and DuPONT, O. Proc. Soc. Exp. Biol. and Med. 47: 318-321, 1941. Data are given for the total weight of the viscera as well as the individual organs. The rabbits were adult, albino males of the New Zealand variety.

171. Tierexperimentelle Wachstumstudien IV. Mitteilung.

LIESENFELD, Fr., DAHMEN, H., and JUNKERSDORF, P. Pflüger's Archiv. f. Gesamte Physiologie 216: 712-728, 1927.

172. The effect of administering massive doses of B₁₂ on the weight curve, weight of organs and hematological condition of growing rats.

LIGORI, M. Rend. ist. Super. Sanita 20: 555-569, 1957 (English summary). The results were essentially negative for both young and old rats.

173. Preliminary investigation of the Atlantic Walrus (*Odobenus rosmarus*, Linn.)

LOUGHREY, A. G. Wildlife Management Bull. Ser. 1, No. 14 (Ottawa) 1959. The weights of the internal organs are given for only one adult male.

174. Prenatal growth of the pig.

LOWREY, L. B. Am. J. Anat. 12: 107-138, 1911. One hundred five pig embryos from 22 litters were used in this study, both fresh and formalin-preserved specimens. All the major organs were weighed and are reported as per cent of total body weight.

175. Factors which determine renal weight. II. Age.

MacKAY, L. L., and MacKAY, E. M. Am. J. Physiol. 83: 191-195, 1927. In this paper the kidney is related to body length as well as body weight and body surface. Kidney weight in the albino rat has a less variable relationship to body surface than to either body weight or body length.

176. Factors which determine renal weights. III. Sex.

MacKAY, L. L., and MacKAY, E. M. Am. J. Physiol. 83: 196-201, 1927. The female albino rat has less renal tissue per unit of body size than the male rat, whether the unit be taken as body weight, length or area.

177. Factors which determine renal weight. IV. Pregnancy and lactation.

MacKAY, L. L. Am. J. Physiol. 86: 215-224, 1928. The kidney weight in the albino rat does not seem to be changed by pregnancy, but it does seem to increase during lactation. Heart weight changes are discussed.

178. Weights of various organs in the adult rat after inanition with or without the dietary accessories.

McLENNAN, C. E., and JACKSON, C. M. Arch. of Path. 15: 636-648, 1933. The relative changes observed in the organ body-weight relationships of rats on several deficient diets are discussed. Fifteen adult rats were used in each of the four experimental groups.

179. Changes in the liver glycogen content and of the weight of certain organs in connection with ovariectomy.

MAKAREVICH-GALPERIN, L. M., and USHENKO, S. N. Problemy Endokrinol. i Gormonoterap 4, No. 6, 8-14, 1958. The weights of the liver, spleen and adrenals of female rats were studied both after variable periods of fasting and after ovariectomy.

180. On the relations between the weight of the brain and its parts and the stature and mass of the body in man.

MARSHALL, J. J. Anat. and Physiol. 26: 445-500, 1892. This correlation of brain weight, body weight, height, and sex, also includes data on the insane as well as normal individual.

181. Relation of certain endocrine glands to body weight in growing and mature guinea pigs.

MIXNER, J. P., BERGMAN, A. J., and TURNER, C. W. Endocrinology 32: 298-304, 1933. Pituitary, thyroid, adrenal and gonadal weights were taken for 207 male and 146 female animals with the idea of setting up a useful standard of reference.

182. Pituitary weight of growing male albino rat related to body weight.

MIXNER, J. P., and TURNER, C. W. Endocrinology 31: 261-263, 1942. One hundred thirty-five rats were used, ranging in body weight from 60 to 383 gm. They were Wistar strain.

183. Rensch on the increase of heart-weight in relation to body-weight with increase in altitude.

MOREAU, R. E. *Ibis* 86: 30-32, 1944. This is a critical appraisal of Rensch's paper. The author finds many serious omissions and errors in that work.

184. Weights of thyroid and parathyroid glands of normal male dogs.

MULLIGAN, R. M., and FRANCIS, K. C. *Anat. Rec.* 110: 139-143, 1951. The glands were fixed in Zenker's fluid and stored in 70 per cent ethyl alcohol before dissection and weighing. Correlation was then attempted between weight of the glands and body weight and age.

185. Variation in relative heart size of certain passerines with increase in altitude.

NORRIS, R. A., and WILLIAMSON, F. S. L. *Wilson Bull.* 67: 78-83, 1955. Weights were taken on the fresh tissue of 12 species. It is apparent that there is a higher heart ratio in the populations from the high altitudes.

186. The effect of age, sex, and body size on the heart weight-body weight ratio in the dog.

NORTHRUP, D. W., VAN LIERE, E. J., and STICKNEY, J. C. *Anat. Rec.* 128: 411-417, 1957. The heart body weight ratios of 346 adult dogs of both sexes and of 135 pups is presented. Adults show differences in the ratios according to sex; pups do not.

187. *Über die Wachstumsverhältnisse des Körpers und der Organe.*

OPPENHEIMER, C. *Zeit. f. Biol.* 25: 328-357, 1889. Absolute and relative weights of the principal organs are given for both males and females from birth to 25 years of age. This was fresh post-mortem material.

188. *Ueber die Grössenverhältnisse des Herzens bei Vögeln.*

PARROT, C. *Zool. Jahrb.* 7: 496-522, 1893.

189. Biometrical studies on man. I. Variation and correlation in brain-weight.

PEARL, R. Biometrika 4: 13-104, 1905. See, J. Comp. Neurol. 15: 467-481, 1905 for a resume. This is a compilation and a statistical reworking of a number of important studies done by other authors. The brain weights are those of several European races.

190. A comparison of certain gland, organ and body weights in some African ungulates and the African elephant.

QUIRING, D. P. Growth 2: 335-346, 1938. The body weights, brain, heart, adrenal, thyroid, liver, kidney and lung weights in 21 ungulates, one hyrax and one elephant were compared by application of the formula $Y = bX^k$.

191. Notes on an African elephant (*Elephas loxodonta Africana*).

QUIRING, D. P. Growth 3: 9-13, 1939. The organ weights are given for this single, exceptionally large, male whose total weight was over seven tons.

192. The scale of being according to the power formula.

QUIRING, D. P. Growth 5: 301-327, 1941. It is concluded that the equation $Y = bX^k$ best expresses the degree of development of the brain, thyroid, adrenal and heart in the growth of animals belonging to many diverse groups. 35 tables of organ weights establish, in the author's opinion, a scale of being in numerical terms. This represents an extension of the cephalization coefficient of Dubois (1898).

193. The weight of the principal components of the hypophysis cerebri of the adult human female.

RASMUSSEN, A. T. Am. J. Anat. 55: 253-275, 1934. This study was made on preserved material, and the weights of the components were related to age rather than to total body weight. Nevertheless, these data on 200 cases deserve consideration.

194. Der Einfluss des Tropenklimas auf den Vögel.

Rensch, B. Proc. 7th Internat. Ornith. Congr. 1930: 197-205, 1931. The author asserts that, in some passerines (*Dicaeum igniferum*, *Acmonorhynchus annae*, and *Cinnyris jugularis ornata*) from tropical regions, the ratio of heart weight to body weight increases markedly with increase in altitude. The series of specimens is small and the method of obtaining the data is rather vague.

195. Studies on the physiology of reproduction in birds. XXIII. Growth of the gonads and bursa Fabricii in doves and pigeons with data for body growth and age at maturity.

RIDDLE, O. Am. J. Physiol. 86: 248-265, 1928. Growth curves are presented for testes, ovaries, thymus and bursa in both species, from the age of two weeks to 45 months.

196. Studies on the physiology of reproduction in birds. XXXI. Effects of anterior pituitary hormones on gonads and other organ weights in the pigeon.

RIDDLE, O., and POLHEMUS, I. Am. J. Physiol. 98: 121-130, 1931. The weights of adrenals, thyroid and liver is given for 39 control birds, both pigeons and ring-doves. These animals were immature but of nearly full body weight.

197. The growth and age involution of the thymus in male and female pigeons.

RIDDLE, O., and FREY, P. Am. J. Physiol. 71: 413-429, 1925. Data are presented on the weight relations of the thymus in three kinds of pigeons. Comparison is made with rat and man.

198. Relation of kidney weight to the total body weight in cats.

ROAF, H. E. J. Physiol. 47: XX. 1913. In a series of 49 cats of both sexes it was found that the kidney weight increases more rapidly in proportion than does the body weight.

199. Organ-body weight relationship in the toadfish, *Opsanus tau*.

ROBINSON, P. F., WILBER, C. G., and HUNN, J.,
Chesapeake Sci. 1: 120-122, 1960. These organs from
77 male and 55 female toadfish were weighed: heart, liver
spleen, gut, brain, eyes. Prediction equations for organ
weight in terms of total body weight were derived.

200. Organ: body-weight relationships in the hamster.

ROBINSON, P. F., and WILBER, C. G. Anat. Rec. 141:
1-3, 1961. The following organs were weighed in 85 male
and 99 female hamsters: brain, heart, kidney, liver, lung
and spleen. Prediction equations for the various organs
were derived in terms of body weight.

201. Some observations on the gross anatomy of the genital system
and two endocrine organs and body weights in the chinchilla.

ROOS, T. B., and SHACKELFORD, R. M. Anat. Rec. 123:
301-311, 1955. The weight of the testes, ovaries, adrenals
and pituitaries was determined in a large number of adult
animals only.

202. The toxicological basis of threshold limit values: 2. Pathologi-
cal and biochemical criteria.

ROWE, V. K., WOLF, M. A., WEIL, C. S., and
SMYTH, H. F., Jr. Am. Ind. Hyg. Assoc. J. 20: 346-349,
1959. Summaries are presented to show the frequency with
which changes occur in body-organ weight ratios during
toxicological investigations. Liver and kidney weights are
those most frequently affected by a toxic compound.

203. The development and morphology of the gonads of the mouse.
IV. The post-natal growth of the testes.

ROWLANDS, J. W., and BRAMBELL, F. W. R. Proc.
Roy. Soc. (London) S. B. 112: 200-214, 1933.
Approximately 140 male mice whose ages ranged from
birth to 300 days were employed in this research. The
cleaned-body weight was used since it was felt that this
technique gave a more constant result. The stomach and
intestine were removed and the bladder was evacuated. A
linear regression for both testes showed the right to be
significantly heavier.

204. Vitamin A in the liver of the Alaska fur seal.

SANFORD, F. B., KENYON, K. W., and SCHEFFER, V. B.
Comm. Fish. Rev. 11: 9-15, 1949.

205. The prenatal growth of the human pancreas.

SCAMMON, R. E. Proc. Soc. Exp. Biol. and Med. 25:
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respect to body-weight, has been studied from 319 observa-
tions on human fetuses varying in total body weight from
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the relationship between total body weight and the weight
of the pancreas.

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SCAMMON, R. E., and ARMSTRONG, E. L. J. Comp.
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71 fetuses does not relate to total body weight, but to total
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207. Weights of organs and glands in the northern fur seal.

SCHEFFER, V. B. Mammalia 24: 476-481, 1960. This
is a tabulation of the major organs and glands of a large
number of specimens of *Callorhinus ursinus*, both immature
and adult of both sexes. Comparisons are made between
percentage weight of the carcass in the fur seal and in the dog
or in man.

208. Measurement of some physiological parameters in rainbow
trout.

SCHIFFMAN, R. H., and FROMM, P. O. Canadian J.
Zool. 37: 25-32, 1959. Fingerlings were used with a total
length of from 11.3 to 15.7 cm and wet weights of from
8.7 to 29.1 g. The organs weighed were kidney, liver and
spleen.

209. Effect of the estrous cycle on the action of testosterone propionate on the organ and body weights of female rats.

SCHILLING, W., and LAQUEUR, G. L. *Endocrinology* 30: 753-760, 1942. The mean body weight of this group of 56 animals was 160 gm. Thyroid, liver, kidneys, adrenals, ovaries and uterus were weighed.

210. Studien über Wachstum und Differenzierung. III. Die embryonale Wachstumskurve des Hühnchens.

SCHMALHAUSEN, J. W. Roux' *Arch. f. Entwicklungsmech. d. Organismen* Bd 108, S. 322-387, 1926.

211. Beiträge zur quantitative Analyse der Formbildung I. Über die Gesetzmässigkeiten des embryonalen Wachstums.

SCHMALHAUSEN, J. W. Roux' *Arch. f. Entwicklungsmech. d. Organismen* Bd. 109, S. 455-512, 1927.

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SCHMALHAUSEN, J. W. Roux' *Arch. f. Entwicklungsmech. d. Organismen* Bd. 110, S. 33-62, 1927.

213. Untersuchungen über die Gewichte von inneren Organen bei Mastschweinen und ihre Beziehungen zu Leistung und Körperform.

SCHMIDT, J., and VOGEL, H. *Züchtungskunde*, Bd. 6, S. 224-232, 1931. The weight of the heart, liver, kidneys and spleen of both male and female swine were compared with the body weight, which was in all cases near 105 kg.

214. Das absolute und relative Gewicht des Herzens, der Lunge, der Leber, der Niere und der Milz vom Rind.

SCHNEIDER, J. *Ztschr. Fleisch - u. Milchhygiene* 14: 393-398, 1904.

215. The relative weight of the testes in primates.

SCHULTZ, A. H. *Anat. Rec.* 72: 387-394, 1938. This paper records the weight of the body and of the testes and the percentage relation between the two for a total of 80 adult and 2 juvenile Simian primates. Both Old World and American monkeys are considered.

216. Relationship between body weight and gastrocnemius-soleus muscle weight in growing rats.

SCHWARTZ, N. B. *Growth* 17: 123-126, 1953. Ninety-five male Sprague-Dawley rats 21-110 days old, weighing from 30 to 420 grams were used. Both wet and dry weight were recorded.

217. Ueber die Abnahme der Organe, insbesondere der Knochen. beim Hunger.

SEDLMAIR, A. C. *Zeitschr. f. Biol.* 37: 25-58, 1899. Some increase was noted in the weight of the brain of the cat during a period of starvation. The eyeballs and lung showed little absolute weight loss, hence, a considerable gain in relative weight.

218. Effect of pituitary growth hormone on lymphatic tissues; thoracic duct lymph flow, lymph protein and lymphocyte output in the rat.

SHREWSBURY, M. M., and REINHARDT, W. O. *Endocrinology*. 65: 858-860, 1959. The administration of beef anterior pituitary growth hormone to hypophysectomized rats caused an increase, out of proportion to body weight gain, in the weights of the thymus and spleen.

219. The quantitative investigation of the vertebrate brain and the applicability of allometric formulae to its study.

SHOLL, D. *Proc. Roy. Soc. London Ser. B*, 135: 243-258, 1948. A discussion of the estimation of parameters in the allometric equation is presented. A new method is described whereby both the estimates and their standard errors are determined in a simple manner.

220. Organ weights and symmetry problems in porpoises and seals.

SLIJPER, E. J. Arch. Neerl. Zool. 13: 97-113, 1958. Tables are included in this paper of the organ weights in per cent of body weight for the common porpoise (*Phocaena phocaena*) and the common seal (*Phoca vitulina*).

221. Efficiency of criteria of stress in toxicological tests.

SMYTH, H. F., Jr., WEIL, C. S., ADAMS, E. M., and HOLLINGSWORTH, R. L. A.M.A. Arch. Ind. Hyg. Occup. Med. 6: 32-36, 1952. It is pointed out that liver and kidney weights are valuable criteria of toxicity in studies involving the feeding of compounds to rats. Hypertrophy of these organs often precedes recognizable histological change.

222. Variation and correlations of the organs of single comb white Leghorn cockerels.

SOUBA, A. J. Anat. Rec. 26: 291-297, 1923. The data presented is from a group of 100 birds, selected from a larger group, which showed normal growth to the age of 100 to 120 days. Coefficients of variation are calculated for testes, spleen, liver, kidneys, pancreas and heart.

223. Weight and composition of organs during the reproductive cycle in the rat.

SOUDERS, H. J., and MORGAN, A. F. Am. J. Physiol. 191: 1-7, 1957. Observations were made on 11 organ and gland weights of a total of 183 female rats in four different physiological conditions: parturient, lactating, resting, and unmated.

224. Organ: body weight, protein: organ and fat: organ ratios in large albino rats.

SPERLING, F. Growth 17: 1-6, 1953. These data are based on 11 male Osborne-Mendel rats weighing between 400 and 537 grams. The animals had previously spent a week in a sealed metabolic chamber, during which time they were fed a liquid diet.

225. Brain weights of animals with special reference to the weight of the brain in the Macaque monkey.

SPITZKA, E. A. J. Comp Neurol. 13: 9-17, 1903.

226. Experimental studies on the hypophysis cerebri. I. The effect of a single pregnancy in the albino rat.

STEIN, S. I. Endocrinology 17: 187-198, 1933. There seemed to be no weight change in this organ that could be attributed to pregnancy. The bibliography of 36 titles attached to this paper may be of interest to those who may wish to pursue the subject further in other species.

227. Deskriptive Anatomie des Auges der Wirbeltiere und des Menschen.

STEINDORFF, K. Tab. Biol. 22: 166-297, 1947. The material dealing with eye weight is found on pp. 182-188. Many species are included, along with the references to the original papers.

228. Growth of the body and of the various organs of young albino rats after inanition for various periods.

STEWART, C. A. Biol. Bull. 31: 16-51, 1916. Twenty male and 25 female rats were used. The experiments began after the animals were weaned (three weeks of age).

229. Changes in the relative weights of the various parts, systems and organs of young albino rats underfed for various periods.

STEWART, C. A. J. Exper. Zool. 25: 301-353, 1918. Eighty-nine young rats were used. The majority of the test group were starved for intermittent periods starting at birth, while some were starved after attaining the age of 3 weeks.

230. Weights of various parts of the brain in normal and underfed albino rats at different ages.

STEWART, C. A. J. Comp. Neurol. 29: 511-528, 1918. The brain of starved rats continues to grow, although at a reduced rate as compared with normal rats. The brain growth is continued through a period of almost stationary body weight.

231. Changes in the weights of the various parts, systems and organs in albino rats kept at birth weight by underfeeding for various periods.

STEWART, C. A. Am. J. Physiol. 48: 67-78, 1919. Most of the organs gain in weight, except the thyroid, ovaries, lungs and suprarenals, which remain practically unchanged. The liver and thymus suffer a loss in weight.

232. Possible relations of the weight of the lungs and other organs to body weight and surface area (in dogs).

STEWART, G. N. Am. J. Physiol. 58: 45-52, 1921. In a series of 44 dogs, the weight of the spleen and heart seem to be more proportional to the body weight than to the surface area. The reverse seems to be true for the liver, stomach, intestine, kidneys and lungs.

233. The genetic and endocrinic basis for differences in form and behavior.

STOCKARD, C. R. Am. Anat. Memoirs No. 19, Wistar Press, Phila. 1941, 774 pages. Figures are given for the normal relations of endocrinic weight to body weight in dogs, as well as the weight relationships that obtain in the case of unusual hybrids.

234. Relative growth of the kidney in male rats.

STOERK, H. C., and ZUCKER, T. F. Proc. Soc. Exper. Biol, and Med. 61: 297-299, 1946. This work carried out on 150 rats of unspecified stock indicates that the growth in weight of the kidney in relation to body weight can be divided into 3 phases.

235. On the weight of the ovaries in the albino rat during gestation and normal lactation: also in females deprived of their new-born litters.

STOTSENBERG, J. M. Am. J. Physiol. 65: 77-89, 1923. Besides the data presented there is discussion of the causes of the variations found.

236. Comparative studies on the growth of the cerebral cortex.
I. On the changes in the size and shape of the cerebrum during the postnatal growth of the brain. Albino rat.

SUGITA, N. J. Comp Neurol. 28: 495-510, 1917. The brain weight at various stages of postnatal growth is correlated with five diameters taken at fixed localities. 141 albino rats were used.

237. Comparative studies on the growth of the cerebral cortex.
IV. On the thickness of the cerebral cortex of the Norway rat (*Mus norvegicus*) and a comparison of the same with the cortical thickness in the albino rat.

SUGITA, N. J. Comp Neurol. 29, 11-39, 1918. In this and the preceding section of this work there are data on increase in tail length with body growth and the percentage of water in the brain of the Norway and the albino rats of the same age.

238. Weights of right and left kidney in dogs.

SWANN, H. G., and RAILEY, M. J. Texas Repts. on Biol. and Med. 17: 256-258, 1959. The right and left kidney of 57 adult mongrel dogs were found to weigh almost exactly the same. There was no sex difference. The ratio of kidney weight to body weight averages 0.00582.

239. Comparison of conformation, anatomy and skeletal structure of a highly specialized dairy cow and a highly specialized beef cow.

SWETT, W. W., Graves, R. R., and MILLER, F. W. J. Agri. Res. 37: 685-717, 1928. The weights of the internal organs are given for two cows, one a purebred Jersey, the other an Aberdeen Angus. The brain and spinal cord were not included in the measurements.

240. The regulation of renal activity. VIII. The relation between the rate of urea excretion and the size of the kidneys.

TAYLOR, F. B., DRURY, D. R., and ADDIS, T. Am. J. Physiol. 65: 55-61, 1923. Under certain conditions the rate of urea excretion in the rabbit varies in direct proportion to the weight of renal tissue and this, in turn, is more constantly related to the body surface area than to the body weight.

241. Body and organ weights of rats during acclimatization to an altitude of 12,470 feet.

TIMIRAS, P. S., KRUM, A. A., and PACE, N. *Am. J. Physiol.* 191: 598-604, 1957. Long-Evans male animals were maintained for periods up to a year.

242. Anatomische, physiologische und physikalische Daten und Tabellen.

VIERORDT, H. ed. 3. Jena. Gustav Fisher, 1906. In this handbook there are many tables of organ weights and their relation to body weight, height and age in man.

243. Organ work and organ weight.

WALTER, F., and ADDIS, T. J. *Exper. Med.* 69: 467-483, 1939. Formulas are presented here for the prediction of organ weight from body weight. Experimentally, changes in organ weight were induced by introducing dietetic and metabolic variables into otherwise constant conditions. Albino rats were used throughout.

244. The effect of the bearing of young upon the body weight and the weight of the central nervous system of the female white rat.

WATSON, J. B. *J. Comp. Neurol.* 15: 514-524, 1905. Observations are recorded of the body weight and brain and spinal cord weights of mated and unmated rats (female).

245. Organ: body weight ratios for liver, kidneys and spleen of laboratory animals. I. Albino rat.

WEBSTER, S. H., LILJEGREN, E. J., and ZIMMER, D. J. *Am. J. Anat.* 81: 477-513, 1947. The normal variation was determined in the post-mortem relative weights of the liver, kidneys and spleen of male and female rats of 12 weight groups. Four hundred sixty-one animals were used of both Wistar and Sprague-Dawley strains.

246. Organ: body weight ratios for certain organs of laboratory animals. II. Guinea pig.

WEBSTER, S. H., and LILJEGREN, E. J. Am. J. Anat. 85: 199-230, 1949. The normal variation was determined in the post-mortem relative weights of the liver, kidney and spleen of both male and female guinea pigs. Two hundred and thirty-five animals of a mongrel inbred strain were used. Heart and lung weights were determined on 106 of these animals.

247. Organ: body weight ratios for certain organs of laboratory animals. III. White Swiss mouse.

WEBSTER, S. H., and LILJEGREN, E. J. Am. J. Anat. 97: 129-153, 1955. The normal variation was determined in the post-mortem relative weights of the liver, kidneys, spleen, heart and lungs of 187 animals. Their body weights ranged from 2 to 48 grams.

248. Gewichtswerthe der Körperorgane bei dem Menschen und den Thieren.

WELCKER, H., and BRANDT, A. Arch. f. Anthropologie 28: 1-89, 1903. This extensive work is much quoted in the European literature. Its 42 large tables cover many species. There is included in the introduction a partly annotated bibliography of about 90 early papers pertaining to the problem of body: organ weight relationships.

249. Data on relative heart size of the Warbling Vireo and other passerines from high altitudes.

WILLIAMSON, F. S. L., and NORRIS, R. A. Wilson Bull. 70: 90-91, 1958. Data is presented on 73 specimens of 24 species that were not included in the preceding report (Norris, 1955).

250. Growth of the liver in fetal rats.

WILLIAMSON, M. B. Growth 12: 145-147, 1948. Twelve litters, comprising 75 young, were used. These were albino rats.

251. Growth changes in body organs. III. Growth changes in the pituitary of the normal dog.

WHITE, J. B., and FOUST, H. L. Am. J. Vet. Research 5: 173-178, 1944. A total of 203 dogs, 82 males and 121 females, ranging in age from full term to very old age were used in this study. Weights were taken on the fresh tissue. There appears to be no sex difference in pituitary weight, which confirms the earlier work of Latimer.

252. A comparison of the body and endocrine gland (adrenal, thyroid and pituitary) weights of emotional and nonemotional rats.

YEADEL, E. H., and RHOADES, R. P. Endocrinology 28: 337-340, 1941. This work is a comparison of body and gland weights of two strains of rats which were selectively bred for emotionality and nonemotionality. Significant differences are demonstrated between the sexes and the two psychologically divergent types.

253. Kidney hypertrophy in B complex deficiency.

ZUCKER, L. M., and ZUCKER, T. F. Proc. Soc. Exper. Biol. and Med. 61: 299-300, 1946. The kidneys of 20 young rats kept on a B-complex deficient diet were 50 percent heavier than those of the controls.

254. Growth of the brain in the Rhesus monkey.

ZUCKERMAN, S., and FISHER, R. B. Proc. Zool. Soc. (London) B 107: 529-538, 1937. The data analyzed in this report relate to 102 female and 93 male Rhesus monkeys (*Macaca mulatta*) of which brain weights were recorded in 66 females and 42 males. The brains were weighed before fixation.

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Development Laboratories, Army Chemical Center, Maryland
AN ANNOTATED BIBLIOGRAPHY OF STUDIES ON ORGAN:
BODY WEIGHT RELATIONSHIPS - Paul F. Robinson

CRDLSP 2-46, December 1961
Task 4C08-02-NEW-04, UNCLASSIFIED REPORT

This bibliography deals chiefly with those papers whose primary
aim is the presentation of data upon the organ; body-weight
relationships in normal animals of a particular species.

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1. Body Weight
2. Organ Weight
3. Mammal
4. Bird
5. Reptile
6. Fish
7. Amphibian

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