No. 25. SIXTEEN-YEAR OLD GIRL.

MAIN POINTS OF OPERATIONS.	CONDITIONS BEFORE OPERATIONS.	OBJECTIVE CONDITIONS AFTER OPERATIONS.	SUBJECTIVE FUNCTIONAL RESULTS.
Astragalectomy. Two years later extensor longus hallucis tendon was transplanted to head of first metatarsal bone, and first phalangeal joint of great toe stiffened.	Moderate valgus deformity. All lower leg muscles weak. Moderate hyperextension of great toe. Hip dislocated. Quadriceps partly affected in thigh. No brace worn. Duration of paralysis, since babyhood.	Six years after her first operation the foot shows a good position but is rather unsteady in weight-bearing. There are a few degrees of passive motion at the ankle. The position of the toe has been improved, but some motion in first phalangeal joint of toe still exists. No braces worn.	Patient says she is worse than before operation because of the instability of the foot.

No. 26. FOURTEEN-YEAR OLD GIRL.

MAIN POINTS OF OPERATIONS.	CONDITIONS BEFORE OPERATIONS.	OBJECTIVE CONDITIONS AFTER OPERATIONS.	SUBJECTIVE FUNCTIONAL RESULTS.
Astragalectomy. Peroneus longus tendon transplanted into tibialis anticus tendon. Peroneus brevis and tertius tendons transplanted into tendo Achillis.	Calcaneo-valgus deformity. Tibialis anticus paralyzed. Tendo Achillis group weak. Peroneals fairly strong. Some cavus deformity. Wore leather ankle support. Duration of paralysis, twelve years.	Four years and five months after operation the foot is in good weight-bearing position, slight valgus with arch well preserved, good stability. Voluntary dorsal flexion is possible through a few degrees. Tendo Achillis of fair strength. Passive motion to right angle dorsally, also moderate adduction and abduction. Wears a leather ankle support.	Considerable improvement from patient's standpoint.

THE CARNIVOROUS AND HERBIVOROUS TYPES IN MAN: THE POSSIBILITY AND UTILITY OF THEIR RECOGNITION.

II. CERTAIN GENERAL CONSIDERATIONS.

BY JOHN BRYANT, M.D., BOSTON.

INTRODUCTION.

THE proposition of the carnivorous and herbivorous types in man, as presented in a recent number of this JOURNAL,¹ has met with numerous expressions of interest in various quarters. Being, however, somewhat new, it is doubtless not to be wondered at, that although the basic idea appears to have created a favorable impression, the utility or even the possibility of applying the theory to the actual conditions of practice has remained in doubt. Therefore it is desired to submit a few general observations bearing upon this phase of the question, before considering in detail the set of tables given in the first paper of this series.

The editor of the JOURNAL, in a very sympathetic discussion² of this first paper, mentioned the diatheses, considered certain aspects in the evolution of the types, their characteristics, and referred to possible underlying sex differences.

The writer is in entire agreement with the editor's discussion of these points, which will be re-

viewed and perhaps extended, and then an attempt will be made to show a few angles at which the type theory comes into close contact with actual every day life; angles at which it is believed that the application of the theory will prove of service as a distinct aid in the obtaining of practical results—for example, by the educator, the employer of labor, the life insurance actuary, and the doctor.

DIATHESSES.

In his remarks upon the "Regulators of Metabolism," Paton³ has grouped the three chief influences concerned, in the following concise manner:—

1. Hereditary Inertia or Inherited Developmental Tendencies.
2. The Nervous System.
3. The Chemical Products of Various Organs, the So-called Internal Secretions.

Of these three factors the third doubtless comes to occupy the most prominent place in post-embryonic or certainly in adult life. Thus the various diatheses which have been described ultimately represent the outward manifestations of the vagaries of the ductless glands. There is some evidence to show that within limits the activities of these glands may be varied by persistent attention to diet, but if one recalls the rather constant differences in the ductless gland supply of the two types it will not be difficult to prophesy in which group a given diathesis will

fall: thus exophthalmic goitre suggests the carnivorous, and myxedema the herbivorous type.

EVOLUTION.

Treves⁴ studied evolution in 200 different species of animals, as illustrated by changes in the intestinal canal; he concluded that evolution of the animal species largely depended upon food environment, and that although a gut might acquire specialized characteristics, these were easy to recognize, while the rudimentary character of a given gut remained very constant. Upon the strength of this work, he stated that the carnivore, with its short simple intestine, can be traced back by way of the felines, the canines, the bears and the raccoon, through the insects and cheiroptera, to the amphibians and the monotremes, among the latter of which one finds the echidna, and still lower the ornithorynchus. The herbivore, on the other hand, has an entirely different intestinal ancestry, leading back by way of the rhinoceros, the tapir and the horse, the hog, the hippopotamus and the ruminants, through the ungulates to the rodents and the marsupials. There is no overlapping. These two main groups run parallel and distinct, and are themselves distinct from a third group composed of the edentata which, from the evolutionary point of view, leads nowhere; its ancestors are extinct.

In the human also it seems that the statement of Treves concerning the dependence of type upon food environment must hold good. For example, many observers have demonstrated that within a given species of animal intestinal length is dependent upon the digestibility of the ingested food. But back of such lesser variants one finds active the restrictions imposed by climatic conditions. Thus temperature controls not only food distribution, but growth and differentiation, since these two are incompatibles. At the equator light and heat are intense; plant growth is abundant, but human growth is stopped by early differentiation and maturity. In the temperate zone toward the cold area, conditions are optimum for human growth, but plant growth is less luxuriant. In the arctic regions, with a minimum of both light and heat, human growth is again stunted, and plant growth is conspicuous by its absence. As plant growth decreases with the distance from the equator, so, conversely, man's food becomes more and more carnivorous the nearer he lives to the arctic zone; in these regions he must eat flesh or starve. On account of these and other factors it comes about that man at the equator eats a high carbohydrate diet, the dweller in the temperate zone uses a mixed diet, and the arctic yields a pure meat with high fat diet. It is only reasonable to suppose that this also must have its effect upon development. Doubtless it is for some of these reasons, as well as on account of the higher proteid diet, that the children of the immigrant from Southern Europe tend toward the carnivorous type in our northern states.

Arguing somewhat after this manner, Cattell⁵ has asserted that a boy born in Massachusetts or in Connecticut is fifty times as likely to become a scientific man as a boy born along the southeast seaboard, from Georgia to Louisiana—that is, if he stays put. Somewhat similar ideas are advanced by Ellsworth Huntington,⁶ in an article entitled "Is Civilization Determined by Climate?" He draws attention to the results of bringing the negro north and of bringing the white man south in America, as indicating an inversion of hereditary ability by climate. Huntington recognizes only five centres of high civilization and climatic energy (variability) at the present day: Western Europe, Northeastern United States, Japan, the Pacific Coast of the United States, and Southeastern Australia including New Zealand. He holds that the decline of ancient civilizations, such as those of Mesopotamia, India, and China, was synchronous with climatic alterations. When one keeps in mind these statements, and the fact of the retrogression of the glacial border line during the past ages, it is perhaps interesting if not profitable, to speculate on the northward march of power in Europe. First Egypt, then Rome, Spain and France held the sceptre. Now it is England. After England, then what, and when?

TYPE CHARACTERISTICS.

Given the presence of the two human types in one locality, what may be expected of them? History provides abundant answer. Thus in England the square-jawed Roundheads under Cromwell stirred up the country for a few years and disappeared. The hatchet-faced Puritans found England too crowded and settled a new world. Today hawk-nosed bird-men rule the upper air. The carnivore is the restless pioneer, inductive, dying ever on the outskirts in search of something new.

The herbivore is the sedentary stabilizer, deductive, ever at his appointed task. Both are necessary to the progress of the world, and neither can do the work of the other. It seems unlikely that the human species will ever be reduced to one type, but should this come to pass one might hazard a surmise that the surviving type would be a mixed one, perhaps three parts carnivore and one part herbivore.

SEX AND TYPE.

There can be no question but that in the human species the female tends more to the herbivorous and the male toward the carnivorous type. Doubtless, as among the American Indians the influence of the chase and of the meat diet worked in one direction in the men, and the sedentary habits, hard muscular work, and carbohydrate diet of the squaws was active in the other direction; meat and the wilderness, civilization and cereals, are still in a sense synonymous. But there is another and no less potent factor yet active. This is the demand of pregnancy and

lactation upon the calcium metabolism of the woman. Under present conditions meat for the table is carefully drained of most of its calcium before it leaves the slaughter house. This is proved by the fact that it has been possible for numerous workers to produce a calcium deficiency in laboratory animals by the simple process of feeding them unlimited quantities of meat, corn, and fat. Consequently if a woman is to get an adequate calcium supply for the period in question she must get it from vegetables, from an herbivorous diet, and it is possibly for this reason that many women instinctively crave a calcium-high carbohydrate diet during pregnancy. For this reason then, if for no other, it would seem that woman must ever remain at least predominantly herbivorous, in spite of her very evident present tendency toward the male type. This tendency also doubtless depends on the fact that increasing prosperity results in increasing proteids, especially meat, in the diet, a phenomenon now evident not only in this country, but all over Europe, and in Germany in particular, where per capita meat consumption has doubled in recent years.

The carnivore is dominant among the lower animals, and among men today unless royalty and nobility are now effete, but for the good of the race it is to be hoped that women do not aspire too seriously to join the dominant group.

THE EDUCATOR.

Being concerned mostly with children in the adolescent formative stage, the constructive opportunities of the educator loom large, and a knowledge of type puts at his disposal a means of insight into the mental and physical makeup of his pupil which can in no other way be so easily acquired; the possibilities for helpfulness and prevention are almost limitless. Environment is doubtless important, but it must after all be considered as affecting different material in different ways, and short fat John Johnson will under a given stimulus react in an absolutely different manner from lanky overgrown James Jamieson. Here is a new boy. What is he and how will he act and for what will he be best prepared? Simple anthropometric measurements at once determine whether he is of an extreme or an intermediate type. If he is of intermediate type, a medical examination, with perhaps a thorough Roentgenographic study of the gastrointestinal tract will further aid classification. This accomplished, all else within reasonable limits of error and with only sufficient exceptions to prove the rule, may in a broad way be predicted. The physical and the mental education may be directed into the proper channels, and the working boy may be prepared for a definite occupation with full assurance that it will be one in which he will appear to good advantage. There is also a possibility that when an extreme type is recognized early, persistent attention to diet over years of time may produce some modification of type in a given individual,

should this be thought desirable. In a word, a study of type is one more aid to efficiency.

THE EMPLOYER OF LABOR.

The man and the job: will they fit each other? Some such question is ever presenting itself in one form or another to the employer or his subordinates. How is one to tell? The expert knows at a glance perhaps. Ask him how he knows, and it is doubtful if he can go much further than to say that his judgment is based on experience. Type provides another key, should experience be scanty.

A large employer of labor in one of the government services was discussing type with me. He found the subject interesting, for long experience had enabled him to divide labor into two classes. Being asked on one occasion by the chief of service how much help he wanted for a certain piece of work, he replied without thinking how it would sound to his chief, "about so many broad-backs and so many narrow-backs." Under the circumstances this remark necessitated apology and explanation, but in it lies a nut-shell compend of the relation of labor to type. The explanation was to the effect that the broad-backs were the office force, who stayed behind and worked up the data obtained by the narrow-backs; the latter were to draw their pay for their proficiency in overcoming obstacles to success in field work.

THE LIFE INSURANCE ACTUARY.

The actuary now attributes great importance to blood pressure; it is precisely on this question of blood pressure that knowledge of type may be of use to the actuary, since it is one of the most characteristic points of difference between the two types. Assuming that the normal pressure ranges from about 110 to 140 (systolic) in healthy adults, this range of 30 m.m. may be split in half at 125. The carnivore will usually be found to have a pressure below, and the herbivore above this figure. Therefore a reading of 95 or of 155 must be interpreted according to type. In disease, pressure tends to fall in the carnivore but to rise in the herbivore. Conversely, high pressure is more suggestive of serious trouble in the carnivore, and low pressure in the herbivore. In other words, a pressure of 155, which may be said to be 15 m.m. above the upper normal limit, is so only for the herbivore; for the carnivore it is an increase of 30 m.m., or 100% more serious an indication than for the other type, corresponding to a reading of 170 for the herbivore. The same argument applies to the reading of 95; it is only 15 m.m. low for the carnivore, but 30 m.m. low for the herbivore, corresponding to a drop to 80 m.m. in the carnivore.

A further illustration of the importance of considering type is provided by the way in which certain drugs produce a given action in this person, but its contrary in another person. This

is entirely paralleled in work upon the lower animals, as for instance by the finding of Dale and Laidlaw,⁷ that beta-aminazolyethylamine* produces a large vaso-dilator fall of blood pressure in carnivora, but a vaso-constrictor rise of pressure in the rabbit. It is thus obvious that type provides the actuary with an additional means of calculating the risks he is called upon to insure.

THE DOCTOR.

The set of tables recently presented¹ makes it unnecessary to discuss at length the value of a knowledge of type to the medical man, especially in view of the publication in this JOURNAL of the recent Shattuck Lecture by Dr. Joel E. Goldthwait,⁸ who has in his essay presented a valuable summary of present knowledge of type, the results of his own observations and those of others, under the title "An Anatomic and Mechanistic Conception of Disease." To this article and to the editorial⁹ accompanying it, those interested are referred, with the assurance that they will be convinced on at least two points—that present conscious medical appreciation of type only follows upon some thousands of years of unconscious appreciation of type by the non-medical world, and that the chief lesson to be learned is concerning the value of education upon this subject.

The laboratory worker who conducts his investigations without regard to type leaves them open to criticism. Thus metabolism experiments must be conducted upon individuals of the same type or the subjects will react differently to a given diet. Doubtless in this fact lies a possible suggestion for the solution of certain discrepancies reported by various laboratories working upon a given problem.

Appendicitis has for some years been used as a touchstone for any proper medical discussion. One has to look no further to find a means of illustrating the value of applying type to clinical medicine. The carnivore may have a chronic appendix for years, but the chances are more than ten to one that it will not kill him. It may be said in parenthesis that in him the appendix gets a bad name when it is usually at fault only secondarily to trouble in the region of the hepatic flexure, or because, for instance, the splenic flexure is very high and difficult of passage for ingested food. If, on the other hand, the herbivore ever gets appendicitis, it is likely to be primary, fulminating, and apt to flood the peritoneum with pus, and to cause sudden death. There is nothing mysterious in this difference of the disease in the two types. It is to be expected; it is the natural result of rather constant anatomical differences in the shape of the appendix. The appendix in the carnivore is conical in outline, and the base of the cone is always at the orifice of its lumen, making obstruction improbable. The herbivore, on the other hand, is the unfortunate possessor of an

* The amine from histidine commonly called histamine or erg-amine.

appendix shaped more like a tube with end blind and sides parallel. Its diameter is as great at the tip as at the orifice, unfortunately often greater. There is even a tendency to stricture at the orifice, with results which are only too obvious. Thus it comes about that this type of appendix not infrequently acts as an efficient closed tube for the cultivation of trouble in the form of bacteria. In this connection it may be observed that in a somewhat extensive series of autopsies studied in Europe,⁹ it was without exception the perfectly developed, beautifully modelled herbivorous type of child which died of fulminating appendicitis; the scrawny children died of other things, but not of trouble primary in the appendix.

CONCLUSION.

The theory of type can and should be applied to the conditions of practice. Knowledge of the meaning of type is an asset valuable to the practitioner in every field of human endeavor.

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PNEUMOCOCCIC ARTHRITIS, WITH REPORT OF SIX CASES.

BY JAMES WARREN SEVER, M.D., BOSTON,

*Junior Visiting Surgeon, Children's Hospital, Boston;
Surgeon to The House of the Good Samaritan.*

[From the Orthopedic Department of The Children's Hospital, Boston.]

PNEUMOCOCCIC arthritis is a condition which usually occurs during the course of a pneumonia, and is relatively infrequent. It generally appears during the first nine days of a pneumonia, but may come on at a later period. Primary pneumococcic arthritis attacks are rare. Severe arthritis may follow a mild pneumonia.

Occurrence. Arthritis occurs in about 0.1% of pneumonias. Strickler, quoted by Richardson,¹ has noted that out of 11,846 cases of pneumonia, arthritis occurred 800 times, or 14%, which is unusually high. Herrick, on the other hand, has reported that it occurred but 14 times in 11,706 cases of pneumonia in foreign clinics, or one case to every 800 of pneumonia, which it may be stated is about the usual percentage of occurrence. It may occur at any age, is apt to be more frequent in the first ten years of life, and is seen more often in the male than in the female.

Primary joint infections are more common in