could hardly be calculated in any way; but this reasoning should not be extended too far. The disturbance produced in the human system by a single tapeworm is sufficient to call for prompt measures to remove it.

Recent studies have demonstrated the presence of hæmoglobin in the alimentary canal of many nematode parasites, the pathological effects of whose activities must be counted much more important than heretofore estimated by reason of this blood-sucking habit. Thus in cases of uncinariasis the amount of blood lost from myriads of minute hemorrhages imparts a characteristic reddish-brown color to the fæces, the intestinal wall becomes seriously affected and affords places of easy attack for any pathogenic germs which may be present. This indirect damage may be very serious in the individual instance, and may include primarily or secondarily undesirable retrogressive or progressive histological changes, inflammatory processes, and disturbances in the circulation.

Another source of danger from parasites is one which has long been surmised but only recently demonstrated. A number of investigators have shown that various Cestoda, Acanthocephala, and Eunematoda contain definite poisons (toxins) which when extracted and employed experimentally affect particularly the nervous system and the formation of blood. The continued formation and giving off of such a substance would explain the apparently excessive results of parasitism in some instances, results which are shown prominently in reflex nervous symptoms such as have been noted under Argas (*Arachnida*), and Tænia (*Cestoda*). In a certain proportion of cases pernicious anæmia is the result of this toxic effect, and is accompanied by a mortality of seventeen per cent., according to one report regarding Bothriocephalus. Whether the poison is elaborated by the parasite or is produced by pathological processes in the worm or by its death, as well as the ground for the variability in the toxic action of different specimens, are questions as yet undecided. It has been shown, however, that extracts from different species of helminthes vary considerably in toxic power. Vaullegrard has isolated two toxic principles, one of which acts upon nerve centres and the other upon muscles, and many symptoms produced experimentally by the injection of these substances are analogous to those manifested in parasitic disease. According to this chemical theory, the troubles caused by parasites are due to the formation of toxic substances more rapidly than their elimination by the host, and their consequent accumulation in the system.

It is noteworthy that eosinophilia has been recorded as a frequent if not universal symptom in parasitic infections. From 15 to 50 per cent. of eosinophiles in trichinosis, 10 per cent. in uncinariasis, 15 per cent. in oxyuris infection, and 20 per cent. in ascarid infection are average figures. The percentage varies greatly and does not appear to be constant, while it is present in other pathological conditions as well.

Life History.—Normal parasitism is related to the life history of the parasite with peculiar intimacy. Among accidental parasites the animal seems to continue the usual method of multiplication under the changed conditions. Thus Oerley was able to colonize *Leptodera pellio* in the vagina of mice where they reproduced normally. But in case of the well-known *Rhabdonema nigrovenosum* of the frog the parasitic generation alternates with a free living generation, and the two are distinguished only slightly in structure but radically in method of reproduction, since the one is dicœcious and the other hermaphroditic. In the case of the parasite of Cochin China dysentery also, *Strongyloides stercoralis*, there is a hermaphroditic parasitic generation and a dicœcious free-living generation, in which the individuals differ noticeably from the first. Alternation of generation is not infrequent among true parasites, but it usually bears a different relation to the life history, and one which will be clear after the examination of the simpler cases.

In the simplest case which is exemplified by many of the Nematoda parasitic in the alimentary canal the eggs reach the exterior with the fæces of the host, and in them or in water undergo development until after a brief period of growth, either still enclosed in the protecting egg membranes, as is the case in *Ascaris lumbricoides*, the common stomach worm, or as a free-living form in the water, the larva is ready to be reintroduced into the human alimentary canal. Then it undergoes its transformation into the adult, which is usually only growth, and the formation of the reproductive organs which are present in the larva in the form of a single cell or group of cells near the centre of the body, often so insignificant in the undeveloped condition as to escape observation. This type of development may be somewhat complicated by the sojourn of the parasite in one region of the canal, where it passes through the earlier stages of development and becomes sexually mature before seeking its definitive location. Such is the case in the pinworm, *Oxyuris vermicularis*, which grows to sexual maturity in the ileum, while the pregnant females migrate to the rectum in order to make periodic excursions to the perineum for oviposition.

A more complicated development is illustrated by the Guinea-worm, *Filaria medinensis*, in which the embryos set free into the water seek out a new host and enter its body in order to pass through the early stages of development there. After having attained a certain stage of growth in this host the larval parasite is ready for introduction into the final host, in which it reaches sexual maturity, and this change is effected probably by chance. The host in which the sexually mature parasite occurs is known as the primary, while the secondary is that in which the larva is found.

In the extreme case the life history is so modified that the parasite never reaches the external world, but passes from one host to another directly. Here the ultimate extreme of the parasitic habit has been attained. As illustrations of this several species of *Filaria* and *Trichinella* may be instanced. In *Filaria Bancrofti* the adult is parasitic in lymph glands and the embryos are set free in the blood stream. From this they are sucked out into the body of a mosquito and there undergo early development, only to be reintroduced at a later stage into the body of a new host where the mosquito is biting. In *Trichinella spiralis* the encysted larvæ in flesh are set free in the stomach by processes of digestion. They wander into the duodenum, and after attaining sexual maturity the female penetrates a villus and sets free the embryos which, reaching the muscle tissue through the agency of the blood current, encyst there and await transference to a new host. Thus in both cases no part of the life history takes place in the external world, and the transfer of the parasite is dependent upon the carnivorous or blood-sucking habit of the animal which functions in the one case as secondary host and in the other alternately as primary and secondary host, but in different organs.

A still more complicated relation is found in the majority of Trematoda and in some Cestoda when the change of host is associated also with an alternation of a sexual with an asexual generation. In most Cestoda the eggs develop into an embryo which in the secondary host gives rise by metamorphosis to a pèculiar larva, the bladder worm; and this after its transfer to the primary host develops into the adult tapeworm. The relation between primary and secondary host here is generally that of food and feeder. Thus the bladder worms of the two most common human cestodes are found in the flesh of cattle and hogs respectively and develop when introduced into the alimentary canal of man into the adult tapeworm. Though somewhat complicated by radical changes in form, the process is generally regarded merely as a metamorphosis. The case is somewhat different in those forms, as, for instance, *Tænia echinococcus*, in which the bladder worm proliferates, forming not a single head merely, but several or many, from each of which when introduced into the proper host there may develop an adult cestode. Here the larva in the secondary host multiples asexually, while the adult in the primary host

reproduces sexually. The change of hosts is accompanied by an alternation of generations or metagenesis.

In the Trematoda one finds the same alternation of generations coupled with change of hosts, only that the asexual generation may be repeated and the life history further complicated by the introduction of a new host, the tertiary, in which a stage of the development is passed. Among those forms of which the life history has been ascertained great difference obtains in detail; of the species parasitic in man the development is as yet known only in part so that the general statement may suffice and reference be made for details to the special account of the group given elsewhere.

Mode of Introduction.—The life history often gives a clew to the means by which the parasite gains introduction into the human host. Thus the discovery of bladder worms or of larval *Trichinellæ* in pork suggested at once the manner of infection, namely, by eating the flesh containing these larval stages without the flesh having been subjected during preparation to conditions such as to kill the larvæ. This method of infection, namely, the introduction of encysted larvæ, is characteristic for the Cestoda. Those species most common as adults in man among civilized nations are obtained directly from articles of food, as *Tænia saginata* from beef, *Dibothriocephalus latus* from fish; other less frequent species as *Hymenolepis diminuta*, *Davainea madagascarensis*, and others of which the larval stages are found in insects (cockroach, beetle, meal worm) owe their introduction perhaps to the chance inclusion of such infected insects in bread, puddings, or other similar articles of food.

Disregard of personal cleanliness on the part of the individual, the habit of biting the finger-nails, and among children the practice of sucking fingers or toes serve to infect such with the eggs or embryos of many parasites or to increase an infection already acquired. In this way there is introduced the larva of *Dipylidium caninum* which lives in the dog and cat fleas, the eggs of *Ascaris canis*, the dog and cat round worm, eggs of *Oxyuris vermicularis* which are deposited upon the perineum of the host, eggs of *Cysticercus cellulosæ* when the adult is present in the same host, and many other species. Contamination of hands with eggs from dirt and consequent infection of the individual is common in children and field laborers, and may introduce any form of which the eggs are capable of causing the direct infection; these forms are *Ascaris lumbricoides*, *Trichocephalus trichiuris*, and other Nematoda.

The introduction of eggs and embryos takes place in the majority of cases, no doubt, through the contamination of the water supply. Almost all the eggs of the helminthes develop in standing water, and primitive methods of obtaining drinking-water from pools afford the best means of disseminating the species. Salads and other foods eaten uncooked serve as further means of infection, especially in those regions where it is customary to use human excrement to enrich the soil, or where the water supply of the village is dependent upon infected sources.

Among the important parasites which reach the human system as eggs in water or on uncooked vegetable food are of the Cestoda: *Cysticercus cellulosæ*, the larva of *Tænia solium*, *Echinococcus polymorphus*, the larva of *Tænia echinococcus*; of the Nematoda: *Ascaris lumbricoides*, *A. canis*, *Oxyuris vermicularis*, *Trichocephalus trichiuris*; of the Linguatulida: *Pentastoma denticulatum*, *Porocephalus constrictus*.

Of those which as larvæ attain the human host in the same manner one may list all the Trematoda parasitic in man, and of Nematoda *Strongyloides stercoralis* and possibly *Uncinaria duodenalis*, though according to the studies of Looss the latter seems to bore its own way actively into the body of the host.

The part played by chance in the introduction of parasites is very large. Grubs, hairworms, maggots, and even tapeworms have been taken from wells and from running water. The same forms occur frequently in various kinds of fruit; others in old or carelessly handled meat, also mites in cheese and fruit; and any or all of these may at times reach the human alimentary canal, where according to their adaptability they become occasional, accidental, or pseudoparasites. Their presence may be made known at once by adverse conditions, or they may remain long undetected so that their source is fully unknown. They may reach peculiar locations, as is shown by the flesh fly maggot taken from an abscess in the middle ear, which it had in all probability reached by active migration through the Eustachian tube, having been introduced into the throat with a piece of meat.

Factors Controlling the Abundance of Parasites.—The life of man in communities led at first to a large increase in the number of parasites and to frequent epidemics; and both of these results were due to conditions resulting from the communal life. Of primary importance is the impure water supply which semicivilized communities are wont to draw from the nearest pool. The minute, well-protected eggs of parasites distributed in fecal matter everywhere (for such communities are not exacting in their demands for the disposition of waste) are carried by rain water and distributed over large areas contiguous to the settlements and contaminate generally the surface water of the district. In case the parasite develops directly, the human host becomes infected by the use of this surface water; and if it is a form requiring a secondary host, the same conditions give it easy access to the forms which serve as such, since these are largely domestic animals. The close relation of the abundance of parasites to the water supply is well illustrated by the case of *Bothriocephalus latus*. This form is very common in a few regions in Europe, all of which are proximate to bodies of water. The intermediate host is a fish, and the very means adopted by civilized communities for removing danger of contamination from waste, namely, the sewage system, became the medium through which the eggs and embryos were carried into the lake. There they found suitable secondary hosts in the fish which subsequently reached the city markets further to infect the populace. The life cycle was complete within narrow geographical limits, and the element of chance which plays a large part in limiting the numbers of parasitic animals was reduced to lowest terms.

The dangers of parasitic infection in communal life, which pays little attention to the amount and character of surrounding surface water, is also illustrated by the spread of malaria, elephantiasis, and yellow fever, which depend upon the abundance of mosquitoes bred in this casual water. It has been abundantly shown that criminal carelessness on the part both of individual and community has multiplied breeding places and contributed materially to the spread of these diseases. Even the invention of protective screens has not been able to cope with these aggravating carriers of disease.

The habit of the isolated individual is also that of the community, even such as may be well advanced in the social scale, namely, to deposit human excrement indiscriminately. This method, which even to-day is practised in some parts of the United States, is well calculated to give to eggs of parasites a maximum opportunity for development. The same opportunity is afforded when the Chinese gardener employs for the enrichment of his garden patch human excrement from the neighboring village.

The same massing of individuals which has made the community more liable to parasitic infection plays its part in the infection of the secondary hosts, especially those which are domesticated animals. If the ground on which cattle are grazing becomes infected by tapeworm eggs, the entire herd may receive bladder worms. The infection of a single hog with trichinæ means the contamination of the entire group if the pernicious habit is followed of feeding to others the remnants of a slaughtered animal. Just here is the chief reason for the strong condemnation which has been visited upon local slaughter-houses. They regularly feed the offal to hogs, and by so doing further the spread of such parasites. In the large packing establishments the requirements of modern

industrial success are met by regulations which cure the evils referred to. All remnants are used and are subjected to processes which destroy whatever parasites may be included. Under these conditions one may safely predict the gradual disappearance of parasites, especially with the co-operation of certain factors not yet mentioned.

In addition to municipal features as noted, personal habits play an important part. Cleanliness of person and hands, coupled with careful ablution not only of the person but also of the various articles of food, reduces the percentage of parasitic infection. A simple infection of *Trichocephalus* becomes manyfold greater by the accidental transfer of eggs from the skin near the anus, where they are deposited, to the mouth. The reality of such supposed auto-infection is proved by the high degree of infection among insane and defective classes which are known to exercise little care over personal cleanliness. No doubt many eggs of parasites are introduced on salads and other uncooked foods which are eaten without sufficiently careful cleansing previously.

The employment of footgear and hand coverings is influential also, because it reduces directly the likelihood of infection from eggs of parasites contained in earth, etc., which with uncovered hands become temporarily imprisoned beneath the finger nails of the field laborer. These coverings may also play a considerable part in preventing infection with *Uncinaria* if the observations of Looss are confirmed that the larvæ enter the body by an active migration through the skin, chiefly of the hands and feet, with which they come in contact in the case of field laborers.

Another factor which has tended to reduce the percentage of parasitic infection is the less intimate association of the more highly civilized individuals with domestic animals, especially dogs. The parasites of these animals, and in particular one species, *Tænia echinococcus*, possess great clinical importance for man. Not only is it apparently less frequent than previously, but also its frequence is certainly greatest now in those regions in which the inhabitants live most familiarly with their dogs. It should be noted also that the initial infection of the dog is prevented by keeping from it the offal from slaughtered cattle and sheep.

Probably more influential than any other factor in determining the reduction in degree of parasitism is the use of cooked food. A large part of the flesh food of semicivilized man is eaten raw or only partially cooked, in which condition the larval parasites are capable of development to the adult on reaching the alimentary canal of the new host. Were all animal food eaten only when thoroughly cooked, the common tapeworms and the dreaded *Trichinella* would cease to have clinical importance. The abundance of *Tænia saginata*, the beef tapeworm, where beef is eaten raw, of *T. solium*, the pork tapeworm, where raw ham is a delicacy, and of *Dibothriocephalus latus*, the broad tapeworm, where partly cured fish is eaten uncooked, furnishes the demonstration of the proposition advanced. And so long as pork is eaten uncooked cases of trichinosis will occur, whatever means may be taken to reduce the danger by meat inspection.

That factor which is about to be considered is destined to play the greatest rôle in the limitation of parasitism; it is the intellectual, and by it is brought about the determination of a rational hygiene and its application by the individual. National prejudice or established custom can oppose its introduction only temporarily, and it must ultimately succeed in reducing to lowest terms the parasitic infections of man and the important food animals.

Henry B. Ward.

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References to the important works consulted may be found under *Arachnida*, *Cestoda*, *Hirudinea*, *Mosquitoes in their Relation to Human Pathology*, *Nematoda*, *Protozoa*, and *Trematoda*.

PARATHYROIDS. (NORMAL AND PATHOLOGICAL ANATOMY.)—In 1880 Sandström discovered the presence of small glandular organs on the posterior surfaces of the lateral lobes of the thyroid. He found these to be of constant occurrence, and from their structure regarded them as embryonic thyroid tissue; he accordingly named them *glandulæ parathyroideæ*. A year later, the same organs were independently discovered by Stieda in embryos of the pig, and by Baber in different animals. The former regarded them as carotid glands, the latter as embryonic thyroid tissue. But little attention was paid to these glands until 1891, when Gley asserted their importance. In the few years immediately following, his statements were supported by numerous observers. In 1895 the first careful study of the minute anatomy of the parathyroid was given by Schaper. Numerous experimental investigations followed, both in normal and thyroidectomized animals, showing the physiological importance of these structures. Various names have been proposed for them: "*epithelial bodies*," "*accessory glands*," "*accessory thyroids*," "*glandules thymiques*," etc.; the original designation *parathyroid* has the advantage, however, that the organs are not thereby confused with the accessory glands having the true thyroid structure.

As to the physiology of the parathyroids and their function no absolute knowledge has yet been obtained. It was first believed that they had a direct connection with the thyroid, and could compensate for it. Later experimental investigations in transplantation and extirpation, as well as in feeding with gland substance, have shown that the parathyroids have a function distinct from that of the thyroid. The loss of the thyroid leads to a chronic disease, that of the parathyroids to an acutely fatal disease. Feeding with gland substance is effective only in case of the administration of the same gland substance as that of the organ affected; thus thyroid feeding is of value only in case of the loss of the thyroid, and parathyroid feeding only in case of loss of the parathyroids. In transplantation, both thyroid and parathyroid preserve their characteristic structure.

The various investigators are not yet agreed as to the embryology of these glands, but it may be regarded as proved that the parathyroid bodies lying outside of the thyroid have an independent *Anlage* in the fourth gill pouch. In some animals there occurs constantly an epithelial body included in thyroid tissue, which probably arises from the third gill pouch. This internal epithelial body occurs so rarely in man that its presence may be regarded as a probable anomaly of development. Further, the parathyroids arise from single symmetrical *Anlagen*, and their occasional multiplicity is to be ascribed to a secondary snaring off.

The parathyroids occur usually in pairs; sometimes one on each side, or two on one side and one on the other. The writer has also found three upon one side. The total number observed has never been greater than four.

In size they vary greatly, but they are usually very small; the average, as found by the writer, being about 7 mm. long, 2–3 mm. broad, and 1.5 mm. thick. The average weight is about 0.2–0.3 gm. They are often almond-shaped, having one end recurved; but the shape not infrequently suggests the spleen. At other times they may be flat, cylindrical, or round. Their color is usually pale brown, but may be brownish-red or bluish, so that they are easily mistaken for hæmolymph glands. They usually lie behind the lower poles of the lateral lobes of the thyroid, separated from the thyroid tissue by connective tissue, their convex surfaces lying in slight depressions on the under surface of the lobes. Not infrequently they are found below the thyroid, even as low as the level of the clavicle. It is often very difficult to recognize the parathyroids at the autopsy; therefore all of the glandular structures in this region should be removed for microscopical examination. It is of advantage, in case the organs are not easily found, to take out the neck organs *in toto* and fix them in formalin. After fixation the dissection of the region behind and below the thyroids usually results in the determination of the exact location and relations of the parathyroids, their brown color becoming more prominent in contrast to the white adipose tissue about them. By following up the branches given off from the inferior thyroid artery, just before the vessel passes into the thyroid, the parathyroids are usually easily discovered. They derive their blood supply from these branches. Their veins empty into the veins on the surface of the thyroid, or directly into the inferior thyroid vein. But little is known of the nerve supply. Sacerdotti and Anderson have traced nerve fibres along the vessels and between the epithelial cells.

The microscopical appearances are those of a gland having a delicate capsule, from which thin connective-tissue septa pass in, supporting the larger blood-vessels, and separating the imperfectly developed lobules. The general appearance of the gland may vary greatly. Often it appears as a single mass of closely placed cells, between which run numerous delicate capillaries, forming a network in the meshes of which lie the cell groups or alveoli. No connective tissue accompanies the capillaries. In other cases the lobular arrangement is much more marked, the cells showing a more decided cord-like or alveolar arrangement. The anastomosing columns may consist of a single row or of several rows of cells, arranged upon the capillaries. In other specimens the cells may be grouped into round follicles. Not infrequently all three types are found in one gland.

The cells vary in appearance, so that three chief varieties may be distinguished. The majority are somewhat larger than those of the thyroid; the nucleus stains deeply, the protoplasm but slightly. The boundaries of these cells are visible as fine lines. Besides these, there are large polygonal cells with deeply staining nucleus, very granular protoplasm which stains deeply, and with sharp cell outlines. The third type of cell is low, columnar, and is arranged upon a basement membrane in such a way that the cells radiate toward the centre of the group, giving it the appearance of a follicle. In the centre of this a definite lumen may often be made out. It usually contains a finely granular substance, but may contain a colloid-like material. Occasionally the follicles are cystic. Between these three types of cells there are all possible transition forms.

Many of the large polygonal cells stain heavily with eosin, resembling closely the acidophile cells of the hypophysis. In others fine fat droplets are often present. The follicular arrangement of the cells is always more marked when the lumen-like opening, containing granules or colloid-like material, is present. The different appearances presented by the cell indicate most probably different stages of functional activity.

The circulation of the gland is sinusoidal in character, the epithelial cells being separated from the blood by endothelium only, connective tissue as a rule not accompanying the capillaries. The secretion of the gland, as clearly shown in a hypertrophic parathyroid obtained by the writer in a case of acromegaly, is into the lymph vessels.

According to Benjamins colloid is constantly present. The writer has not found this to be the case, but has found constantly in the open follicles a finely granular substance. He agrees with Benjamins that the parathyroids are individual and constant organs, differing in structure and function from both the fœtal and the mature thyroid; and that the differences in size, form, and staining reactions represent different stages of functional activity.

PATHOLOGY.—Variations in size, shape, and number of the glands occur. Cysts lined with columnar or flattened epithelium may be found near or in connection with the parathyroids, as congenital "rests" of the gill pouch or of a diverticulum of the same. Benjamins suggests that this is an analogue of the *ductus thyreoglossus*, and should be designated as the *ductus parathyroideus*. The writer has observed in one case in man a blind duct, lined with low columnar cells, passing into the parathyroid, its epithelium being directly continuous with that of the gland. Near the entrance of the duct into the parathyroid there were several large cystic follicles containing colloid-like material.

Circulatory Disturbances.—In general venous congestion the capillaries of the parathyroids are dilated; in general anæmic conditions they are collapsed and contain but little blood. Local anæmia may be caused by pressure of strumous thyroids. Hemorrhage, œdema, and inflammation may also be caused by struma.

Retrogressive Changes.—*Pressure atrophy* may be caused by struma of the thyroid. *Fatty atrophy* occurs in old age and in cachexias. Benjamins has observed *hydropic degeneration* in groups of cells, occurring in two cases in which the organ was hyperæmic. The writer has obtained a reaction for *mucin* in the cysts found in one case. He further regards the presence of *colloid material* in such cysts as being of the nature of a degeneration.

Hypertrophy.—In a case of acromegaly with adenomatous tumor of the hypophysis the writer found great enlargement of the parathyroids, the right parathyroid weighing 1.5 gm., the left 1.7 gm.; the right one being nearly 2 cm. long. Both were deep bluish-red. The microscopical examination showed the follicles to be for the greater part cystic, and containing finely granular material staining deeply with eosin. No colloid was found. All transition stages could be observed, from the closed follicle to the cystic ones. The dilated cystic follicles could be seen to possess direct communication with the lymph vessels. The thyroid in this case showed interstitial increase of connective tissue.

Benjamins has seen an interstitial hyperplasia of the connective tissue of the parathyroids in a case of Basedow's disease associated with cirrhosis of the liver.

In struma of the thyroid, according to Benjamins, there is no increase of size in the parathyroids; on the contrary, they are often smaller, and are either normal or show retrogressive changes rather than progressive. These changes are to be referred to the pressure of the enlarged thyroid.

With the exception of the one case mentioned above, Benjamins found no changes in the parathyroids in Basedow's disease.

Benjamins describes a tumor attached to the right lobe of the thyroid, which in structure he regards as closely resembling that of the parathyroid, and regards its origin from the latter as possible.

Functional Relation between Thyroid and Parathyroid.—The evidence at present is against the existence of any close functional relationship between these organs. In conditions of extensive thyroid disease the parathyroids are normal or only secondarily affected. In a case of cretinism with total defect of the thyroid, reported by Maresh and Peucker, the parathyroids were normal. Other disturbances of development of the thyroid occur, in which cases the parathyroids are found to be normally developed. In a case of pigment atrophy of the thyroid Benjamins found the parathyroids normal. According to Vassali and Generali, if the parathyroids be removed at the same time with the thyroid tetany results. If the parathyroid on one side alone be removed, the tetany is transitory. If the parathyroids are not removed, cachexia strumipriva or myxœdema follows.

Whether the case of hypertrophy of the parathyroids in acromegaly is to be regarded as a compensatory hypertrophy on the part of these organs for the hypophysis, or is to be explained as a part of the general hypertrophy occurring in the disease, the writer is not able to decide. The evidences of excessive secretory activity would favor the former view. (See Benjamins, "Ueber die Glandulæ parathyroidæ," *Beiträge zur pathologischen Anatomie*, 31, 1902.) *Aldred Scott Warthin.*

PARATYPHOID FEVER.—Up to the time when the Gruber-Durham-Widal reaction came to be used as a routine method in the diagnosis of typhoid fever no hesitation was felt in classing all the cases presenting certain symptoms as typhoid fever; but with the use of this method it has been recently discovered that in some cases the characteristic serum reaction fails. In these it has been found possible to isolate from fæces, urine, blood, and various other situations, organisms which have been carefully described by a number of workers, and which