was its short duration, but even a short immunity was a decided gain. If the severe chill in the early stage was recognized and dealt with promptly and efficiently an attack of pneumonia might be warded off. An important point in treatment was to get as many free calcium ions into the blood as possible and to avoid decalcifying agents.

Dr. A. F. HEWAT (Edinburgh) expressed his strong belief in the value of alcohol in the treatment of pneumonia. He said he would feel greatly handicapped in dealing with any case of pneumonia if he knew that alcohol must be withheld.

Dr. F. M. GARDNER-MEDWIN (St. Asaph) described some of his results with sodium nucleinate. He had found that all types of lobar pneumonia responded to a single dose of sodium nucleinate, the pneumonic process being terminated in forty-eight hours after its administration. This result was independent of the period of the disease at which the drug was given. The first cases Dr. Willmore and he had treated were cases of heliotrope cyanosis with high fever and delirium; such patients ordinarily all died, but with sodium nucleinate they recovered. Professor Hay had stated that probably 10 to 15 per cent. of all pneumonia patients were doomed from the first to die; Dr. Gardner-Medwin believed that an intramuscular injection of sodium nucleinate, with plenty of soda glucose lemonade, would save 90 per cent. of these "doomed" cases.

THE INFLUENCE OF INTERNAL SECRETIONS ON SEX CHARACTERS.*

BY

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THE sexes are to be distinguished by differences in details of structure and of function, and maleness and femaleness can be defined. For purposes of discussion it is convenient to classify the sex-dimorphic characters as (1) primary genotypic, (2) secondary genotypic (including the primary gonadic), and (3) secondary gonadic. In the establishment and maintenance of this sex-dimorphism the component members of the endocrine system, it has long been recognized, play a most important part. That this is so is illustrated in the following aphorisms, which in their sequence show the historical development of the modern point of view. "Propter solum uterum mulier est, quod est." "Propter solum ovarum mulier est, quod est." "Propter secretiones internas totas mulier est, quod est."

There is no difficulty in demonstrating that the physiological activity of the gonads is a condition of the normal development and maintenance of such of the sex-dimorphic characters as are secondary gonadic, since by definition these are such as are dependent upon the gonad. The criterion of a secondary gonadic character is that it reacts to the physiological activity of the gonad in a particularly definite way. It is established that the gonadic influence punctuates the growth of the long bones, thereby affecting the general proportions of the body; that it influences the development and the functioning of the central nervous system and affects the processes of general metabolism. But in addition, and especially, the physiological activity of the gonads exerts a strong and definite influence on certain structures and functions which constitute the commonly and readily recognized sex-dimorphic characters.

The intimate and significant relation between gonad and secondary gonadic characters is revealed by the results of (1) gonadectomy, (2) gonad implantation, and (3) administration of prepared products of the gonads.

Gonadectomy.

Castration of the newborn male rat is followed by a non-development of the genitalia, but has no effect upon general development. Since there is a sex-dimorphic difference in growth rate, and since orchidectomy does not affect general development, it would seem that growth rate is dependent upon sexuality—that is to say, is a

secondary genotypic character, but that it is not a secondary gonadic character. However, it is more probable that the male-type growth rate of the castrated rat is due to the after-action of the gonadic hormone. In the case of the female the ovary does not function during the ante-pubertal period. This can be demonstrated by injecting ovarian extract or by implanting adult ovary into the immature female, when rapid growth and differentiation of the genitalia ensue, though only in cases in which these have already attained a certain stage of growth.

The effect of castration varies according to the age at which the operation is performed. Following pre-pubertal orchidectomy (later than in the case of the newborn) the genitalia do not develop normally—penis, vasa deferentia, seminal vesicles, and prostate remain incompletely developed and of small size, though the corpus cavernosum attains its full development. In the human the beard does not grow until, in old age, the castrate develops one similar to that of the aged female; the hair in the regio pubis comes to a horizontal base line, whilst the chest, axillae, and the extremities remain hairless. The localization of subcutaneous fat is characteristic; much accumulating in the gluteal region, under the breast, in the trochanters, on the mons veneris, and on the lateral aspects of the upper eyelids. The zone of proliferation of the epiphyses of the extremities persists even to the age of 35, so that the castrate attains a relatively greater height with disproportion of the body. The pelvis remains infantile, as does the larynx. The pituitary commonly undergoes enlargement, so that the sella turcica is increased in dimensions. Erection and cohabitation remain possible for a considerable time in some cases. The general intelligence is not obviously affected, but general apathy is characteristic.

Post-pubertal orchidectomy is followed by a non-development or a disappearance of the beard and a change in the regional distribution of the body hair, and a localized disposition of subcutaneous fat. The larynx becomes small and the voice high-pitched. Sexual libido may persist for some time, but ultimately disappears.

Ovariectomy in the human is performed late in life, and the sequelae are therefore not well marked. Atrophy of the genitalia takes place, especially of the vagina and the uterus. A marked accumulation of fat and an increase in body weight occur. Generally there is a decrease in the size of the breasts and in sexual libido. In some cases ill defined psychical disturbances follow.

The evidence derived from the results of gonadectomy points to the conclusion that the development and maintenance of many morphological, physiological, and psychical characters are dependent upon the integrity and functional activity of the gonads. The gonads affect not only the components of the accessory sexual apparatus, but also such sex-dimorphic characters as the regional distribution of the hair and the pitch of the voice. Metabolism is significantly reduced—that of fats particularly, that of carbohydrates less so, and that of proteins not at all. Following gonadectomy the neat interrelationship of the members of the endocrine chain is disturbed, and certain of the effects of gonadectomy may be but secondary to the indirect effects of this operation upon some other member or members of the endocrine system. It is seen that the effects of gonadectomy upon the sex-dimorphic characters vary according to the time at which the operation is performed in relation to the time of attainment of sexual maturity, pre-pubertal gonadectomy resulting in non-development of the genitalia and secondary gonadic characters, whilst the effect of post-pubertal gonadectomy is in inverse ratio to the age of the individual at the time of operation.

There is no satisfactory evidence which supports the conception that gonadectomy not only leads to the disappearance or atrophy of homologous sex characters, but also to the appearance of the heterologous. The apparent swing of the characterization of the castrated male in the female direction is to be explained more simply on the assumption that there is an agonadic full-grown form, that the female sex-characterization is nearer to this than the male, and that after gonadectomy there is a tendency on the part of individuals of either sex to swing towards the agonadic type.

* The opening paper of a discussion in the Section of Physiology and Biochemistry at the Annual Meeting of the British Medical Association at Edinburgh.

Gonad Implantation.

It is recognized that removal of the gonads is followed by a definite train of events, and it is reasonable to assume that the phenomena which follow gonadectomy are caused thereby. If this is so, then it may be assumed that the successful and timely implantation of appropriate gonadic tissue should result in the restoration of normal sexuality in the case of the agonadic individual, and implantation generally should be followed by phenomena which can be regarded as the effects of this procedure.

There is no difficulty in demonstrating that complete maleness and femaleness cannot be assumed and cannot be maintained in the absence of normally functioning pituitary, thyroid, adrenal, and so forth, but these endocrine glands stand in a different relationship to sexuality from that which the gonad occupies. Extirpation or disease of any of these in the mammal leads to the establishment of a distinct pathological condition, which can only be repaired by the restoration to the general economy of the disfunctioning or absent tissue. Gonadectomy, on the other hand, does not result in a diseased state: the individual becomes altered functionally and structurally, but the change is not so far removed from normality as to constitute disease. The gonads are especially concerned in the development and maintenance of sexuality, and it can be stated that the secondary gonadic characters, which are the most prominent of the sex-dimorphic characters, develop only when in an otherwise healthy body the gonads are functionally normal and active.

It is abundantly established that an animal which is castrated at an early age, and into which at the time of this operation its own testes or those from another animal from the same or from a nearly related species are successfully implanted, will develop normally in respect of the somatic functional and structural sex characters. The prostate, seminal vesicles, and penis in such animals develop so as to remain unexceptional. Partial or almost complete restoration of maleness is possible even in older animals castrated in early life, and the degree of restitution varies with the age of the individual at the time of castration and at the time of implantation, and with the length of the interval between the operations.

It is equally possible to restore femaleness in an individual previously ovariectomized by implanting ovarian tissue, and to prevent the sequelae of ovariectomy by implanting the individual's own ovary or that of a similar or nearly similar biological form at or about the time of ovariectomy. In such cases the uterus does not atrophy, or it increases in size again, and in the human the menses return.

It is established that it is possible to feminize a male by castration and subsequent implantation of ovarian tissue. The latent homologous sex characters—for example, the mammary gland—are stimulated into activity, whereas the heterologous—for example, the penis, prostate, seminal vesicles—remain underdeveloped, or become diminished in size and complexity.

It is established that it is possible to masculinize a female by ovariectomy and subsequent implantation of testis. The uterus and mammae remain undeveloped or shrink, whereas the clitoris increases in size to such an extent that it resembles the male copulatory organ. It seems fairly clear, therefore, that ovarian and testicular hormones are sex-specific, acting only upon those structures with which each is normally associated. It may be, however, that for genetic reasons female tissues—that is, such as are genetically female—respond preferentially to the hormone of the ovary, whereas genetically male tissues respond preferentially to that of the testis. It is established also that the sex-hormones are not specific for each biological form of animal.

It is established that it is eminently possible to produce an artificial hermaphrodite by combining in one and the same body both kinds of gonadic tissues. A male with a normally functioning sex-equipment can, following successful ovarian implantation, come to possess well developed mammae, and a female with a perfectly functioning reproductive system can harbour a testis graft which can proceed to spermatogenesis. Similarly, hermaphrodites can be produced through implantation of testis and ovary into an agonadic individual.

It has been recorded that such experimentation is followed by the development of bisexuality in respect of the psychological characters, but this has not yet been finally established.

In the case of the human, gonad implantation has been performed to "jockey" the individual's own gonads into a greater and more efficient activity, or to repair the agonadic condition. Many such operations have been attended with success, while others have not. Failure is probably due to imperfect technique, and to lack of a precise knowledge concerning the conditions within the body which are pre-requisite to successful implantation. Heterotransplantations have not been very successful, and it is probable that in these cases failure is due to an athreptic immunity, the host being unable to provide the implant with appropriate nutritional conditions. It is established, however, that testicular grafts from certain anthropoids can survive in the human body for many months, possibly even for years, and that the implants can exhibit a normal hormonal activity.

Such experimentation as this confirms the view that in the mammal one and the same somatic structure reacts differentially to ovarian and to testicular hormones. This may be due to the fact that the hormones are different while the soma of the two sexes is the same, that the hormone of the ovary is the same as that of testis while the soma of the male is different from that of the female, or that both hormone and soma are different in the two sexes. It is probable that the last view is the correct one.

Injection of Gonadic Tissue and Extracts.

The results of injection have been conflicting. Definite effects upon the circulation, metabolism, nervous system, and on the sex-dimorphic characters have been recorded, but in the main they have been effects which can be obtained by injection of extracts of animal tissues of all kinds, being characteristic of the action of proteins generally and not of gonadic tissue in particular. The effect of the extract must vary with the method of preparation and with the technique of administration. Moreover, it is not easy to reproduce the relation of gonad and soma by injecting gonadic material, particularly if such an organ exhibits a rhythm in its functioning, and if a quantitative action is involved. Though the evidence derived from injection methods is confusing, it can be said that this is due to imperfections in the methods of preparation and administration, and that there is nothing in this evidence which contradicts the point of view that the gonads, in their physiological functioning, direct the differentiation, and ensure the maintenance, of many of the sex-dimorphic characters.

The part played in sex-differentiation by the gonads and other endocrine glands is well illustrated in cases of spontaneously occurring or experimentally produced abnormality of the reproductive system. For example, the individual with abdominal testes is infecund but not impotent, and the penis, prostate, seminal vesicles, and all the secondary gonadic characters develop normally. In its behaviour the male exhibiting cryptorchidism is hyper-sexed. Similar results follow double vaso-ligation and vasectomy and x-irradiation of the testes. In the case of the ovary also it has been established that the gonad exerts its action upon the soma even after the gametogenetic function is in abeyance or destroyed.

The action of the gonad is demonstrated in cases of intersexuality. In the human there are clinical records of cases in which a periodic change in the psycho-sexual characters was to be noted both in males and females. Several hypotheses have been advanced to account for this. According to one, the soma is perfectly ambivalent, but there are two forms of that particular gonadic tissue which is responsible for the elaboration of the specific sex-hormones. There is a physical basis for the female sex-hormone and another for the male. An individual may find himself or herself equipped with both kinds in the gonads or even with the kind appropriate to the other sex. Normally only the more potent of the two sex-hormones exerts its action, but physiological disturbances may upset the balance, and the other kind of sex-hormone will then exert its effects, and so with such characters as are capable

of responding to this fresh stimulus, transformation in characterization can become evident. It is to be expected that the psychic characters, being more labile, will indicate this change more quickly and more thoroughly than will the morphological characters, which lose their plasticity much earlier.

Another hypothesis suggests that the soma itself can be intersexual for genetic reasons, and that under these conditions the normal hormone elaborated by the normal gonad is not sufficiently potent to guide the differentiation of the sex somatic characters into a state of maleness or of femaleness. For genetic reasons also the gonad itself may be intersexual, and it has been suggested that if this were the case the cure for homosexuality might well be implantation or injection of gonadic material. Such treatment has been practised. For example, the testes of a homosexual man have been removed and those of a normal individual implanted, with, it has been claimed, remarkable success. Other cases have not been successful. Such evidence as exists, however, permits one to assume with reason that many cases of homosexuality are due to some endocrine disharmony, though not necessarily a disharmony of an intersexual kind. In other cases it is by no means impossible that external agencies are responsible for the homosexual condition.

Medical literature includes many records of individuals in whom about the time of puberty a change of sexual characterization occurred. Commonly the case refers to an individual who, in early life, was with reason regarded as a female, yet who later developed many of the typical male characters. Many such cases have been shown to be instances of masculinization of a female by a hypernephroma. Similar adrenal neoplasms in the male have led to precocious sexual development, and, it is recorded, to advanced feminization. It is of importance to note that in these cases the effect of adrenal disfunctioning is only evidenced in the presence of the gonad. In other cases intersexuality has been found to be associated with the presence within the body of both ovarian and testicular tissues. This condition is in every way equivalent to that of experimental hermaphroditism produced in the guinea-pig and other laboratory animals.

There is yet another type of intersexuality which apparently is due to a different cause. In these cases the gonads are testes, usually intra-abdominal, but sometimes lying within the inguinal canals or subcutaneously; the accessory sex-apparatus consists of well developed derivatives of both Müllerian and Wolffian ducts, uterus, vagina, vasa deferentia, sexual vesicles, and prostate being present; whilst the external genitalia range in their form from that of an unremarkable vulva and clitoris to that of a grossly abnormal male with hypospadias and cleft scrotum. In those cases in which the external genitalia are of the female type the individual is regarded as a female. In all cases, however, with development and growth there comes the assumption of typical male characters—growth rate, voice, and regional distribution of hair, whilst the psychic characters in the case of the intersexual human are confused through treatment. Such are the cases of young "women" who become "men."

It may be that these are really females genetically in which ovarian tissue existed in the earlier stages of development, but in which this disappeared to give place to testicular. It may be that these are instances of hermaphroditism in which the ovarian tissue undergoes removal. But it seems more reasonable to regard them as genetic males in which the appearance of the physiological activity of the testes was for some genetic reason delayed, so that the growth of the rest of those structures which constitute the sex-equipment was pursued in the absence of the directing influence of the gonad. If there is a time seriation in the differentiation of the component parts of the sex-equipment, one structure becoming capable of responding to the stimulus of the sex-hormone of the testis before another, then the degree of abnormality of the sex-equipment consequent upon a retardation in the exhibition of the stimulus will be a reflection of the degree of retardation. The facts that there is a very wide range of abnormality in these cases; that they can be arranged in a series with an almost normal female at one end, and an

almost normal male at the other; that in all cases testicular tissue alone is found, whereas in none is evidence of degenerate ovarian tissues present; and that in all cases the later exhibited sex-dimorphic characters are entirely and completely male, point to the conclusion that these cases are males in which the time of differentiation of the testes has been abnormal.

The part played by the sex-hormones in the production of this kind of intersexuality is best illustrated by the case of the bovine freemartin—a genetic female (XX) co-twin to a normal male—the reproductive system of which becomes abnormal during the period of sexual differentiation as a result of the action of the sex-hormone of a male co-twin *in utero*. Twins may be monovular or identical, and those arising from one and the same egg are always of the same sex and very similar in their characters; or they may be binovular or fraternal, resulting from the synchronous fertilization of two separate ova. In the latter case they may or may not be of the same sex, and do not resemble one another any more closely than do brothers and sisters born at different times. Twins in cattle may consist of two normal males, two normal females, one male and one female each normal, or one male and the other an individual with an abnormal reproductive system and known as a "freemartin." In all save one of 126 cases of twins in cattle thoroughly examined, two corpora lutea were found. This shows that twins are almost invariably binovular in this animal, since two ova are concerned in female there is no such anastomosis.

The two fertilized ova pass into the bicornuate uterus and become attached to the uterine mucosa. If they have been discharged from the same ovary, the zygotes usually develop in one and the same uterine horn. As the zygotes increase in size, the embryonic membranes of the two fetuses meet to adhere and in many cases to fuse. If such fusion occurs, an anastomosis of their blood vessels can result, so that a common vascular intercommunication may become established. It is to be noted that in the case of twinning involving one normal male and one normal female there is no such anastomosis.

Thus the situation arises in which the sex-hormone of each developing individual is at liberty to pass into the tissues of its co-twin. The sex-hormone is the instrument which models the sex-organization alone. The internal secretions of the pituitary, thyroid, adrenal, and so forth, can also pass from each individual to the other, but these are mainly concerned in the general and not in the special development of the individual, and will be alike in both twins.

But if it so happens that the twins are bisexual (and a study of the sex-ratio in cattle shows that by the laws of probability three possible sex-combinations in twinning must occur, in the proportion of 1♂♂: 2♂♀: 1♀♀, and that the twin combination that includes a freemartin must be regarded as male: female), and if the fusion of the chorion occurs, and further if a vascular intercommunication becomes established, as it does in seven cases out of eight, the sex-differentiation of both individuals will be directed by that sex-hormone which is exhibited earlier, or which is more potent. The testis becomes differentiated at an earlier stage of development than the ovary, and so the sex-hormone of the male is liberated before that of the female. The female twin (that is, genotypic female) will pursue her sex-differentiation under the direction of the male sex-hormone of her co-twin, and will therefore come to possess more or less completely the organization of the male. The assumption of the male characters in the case of the foetuses examined is imperfect; the external genitalia are of the female pattern, the internal organs of reproduction more or less completely male. The male sex-hormone is liberated before the embryonic gonads of the genotypic female have undergone differentiation into ovaries; such differentiation is prevented, and so there is no question of a competitive action between male and female sex-hormones. The end-result will have a relation to the time of exhibition and to the efficiency of the male sex-hormone. The variation in the size of the testes of the male co-twin and of the extent of vascular intercommunication seems to point to the conclusion that the amount of the hormone is not a significant factor in the production of a freemartin, but

that there is a minimum stimulus, and the reaction is of the "all-or-none" type. It is seen that the tissues of the genotypic male respond completely to the stimulus of the testicular sex-hormone, whereas those of the genotypic female fail to do so. Now it is known that genotypic male and female tissues are to be distinguished by differences in their chromosome content, and it is reasonable to assume that, because of these differences, they differ also in their physiological constitution. It is probable, therefore, that though both kinds may be capable of responding to one and the same sex-hormone stimulus, they will respond differentially. The male co-twin develops testes because he is a genotypic male, and becomes a phenotypic male because he develops testes. His embryonic gonads become testes because their differentiation was pursued under the direction of the male-differentiating reactions elaborated by the interaction of the genes in the sex-determining gene-complex. The sex-hormone elaborated by the testes, passing into the body of the genotypic female, swings her sexual differentiation in the male direction, but the swing is not complete, because the sex-hormone of the testis is not equivalent physiologically to the male-differentiating substances elaborated by the sex-determining factors, and because her tissues are constitutionally different from those of the genotypic male.

It is seen that in the mammal the most distinctive sex-dimorphic characters are the secondary gonadic, and that for the development and maintenance of these the presence and action of functional gonadic tissue is necessary. The physiological action of gonadic tissues of the opposite sex causes the further development of incompletely differentiated structures to follow the direction appropriate to that sex, and, so far as is morphogenetically possible, renders the individual intersexual.

AMOEBIIC DYSENTERY.

I.—INVESTIGATIONS INTO THE LIFE-HISTORY OF ENTAMOEBA HISTOLYTICA.*

BY

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It is now generally agreed that the function of the cyst formation in *Entamoeba histolytica* infections is the propagation of the parasite from one host to another. This belief is based on sundry observations of a more or less satisfactory nature. There is much evidence indicating that in ordinary circumstances the active amoeboid stage of the parasite does not long survive after passage of the faeces. Dobell and O'Connor (1921) write that "In ordinary circumstances the free forms cannot live outside the body for more than a very short time; they die if swallowed." This view is also shared by Wenyon (1926), both as a result of personal observations and of his researches into the literature on the subject. Wenyon also states that "unless cysts are present the animals cannot be infected by feeding." In short, it was until quite recently believed that there are two possible ways of infecting animals—namely, as Dobell and O'Connor write, "by feeding them upon the cysts of the parasite, or by injecting active amoebae into the large intestine."

In further support of the view that the purpose of cyst formation is solely for the propagation of the parasite from one host to another are the investigations which have been made on excystation. This work has suggested that the cysts of *Entamoeba histolytica* will hatch only after they have been subjected to the action of the gastric and pancreatic juices, or to that of the pancreatic juice alone. Study of the literature indicates that this hypo-

thesis is probably mainly based on the observations of Ujihara (1914), of Penfold, Woodcock, and Drew (1916), of Chatton (1917), and of Cutler (1919). Ujihara records that cysts after incubation with gastric juice for twenty-four hours at 37° C. remained for the most part undigested, but that pancreatic juice was much more active. Penfold, Woodcock, and Drew write as follows: "As excysting agents we have tried pepsin in an acid medium, bile, and pancreatic extract, either alone, consecutively, or together, as appeared indicated, but the only success we have had has been with pancreatic extract used alone." Cutler states that "if a solution of 'liquor pepticus' is first allowed to act on the cysts for a short time, followed by a similar solution of 'liquor pancreaticus,' a very large proportion of the treated cysts react." Chatton's experiments were of a different type, but permit of similar conclusions; he fed cats with *E. histolytica* cysts, and sacrificed the animals after periods varying from three and a half to seventeen hours; careful examination of the contents of different portions of the alimentary canal caused him to draw the conclusions that cysts pass through the stomach without alteration, except for digestion of the chromidial bars, and that excystation takes place in the small intestine.

It is remarkable that these workers have either overlooked, or ignored, the very interesting paper of Darling (1913). Chatton, it is true, refers to his work, but offers no comment upon it. Darling describes the gradual disappearance of cysts from moist chamber preparations of heavily infected faeces, and also the development of amoebulae within the cysts, and their emergence. This statement is so definite, and based apparently upon such careful observations, that it is curious it should have escaped comment from those who later worked on the same subject. Probably there are several reasons for this, most influential of which was the general preconception that the cysts must be swallowed before they can develop; another consideration was, doubtless, the possibility that Darling's preparations were—as so often happens in the tropics—contaminated with free-living amoebae. However this be, the fact remains that Darling's work seems to have been more or less ignored, and the view generally accepted that *E. histolytica* only excysts when it has been swallowed and subjected to the influence of the digestive juices. Dobell and O'Connor (1921), in their book on *The Intestinal Protozoa of Man*, after considering previous work on the subject conclude that "it is certain that the cysts never hatch in the colon where they are found, or outside the body."

In 1924, however, an important piece of work was published by Sellards and Theiler, which indicated that *E. histolytica* cysts would hatch when injected intrarectally into kittens; and their work, which was very carefully controlled, has more recently been confirmed by Hoare (1925). This observation is naturally of considerable interest and reopens the whole subject regarding the conditions necessary for excystation of *E. histolytica*; possibly it may have some bearing on relapse production in amoebic dysentery, as it has been suggested by Sellards and Theiler that relapses may, at times, be due to excystation of cysts which have persisted for some time in the colon.

With the object of throwing light on the matter, we have during the past two years conducted numerous experiments, details of some of which have already been published elsewhere (Yorke and Adams, 1926 and 1927). In the present communication we propose to summarize the main conclusions reached in these papers, and to refer to other and more recent observations which appear to us to bear on the life-history of *E. histolytica*.

The work commenced with the inoculation of a couple of tubes of Locke-egg-serum medium (Boeck, 1924, and Boeck and Drbohlav, 1925) with a small amount of human faeces containing numerous cysts of *E. histolytica*, and incubating at 37° C. On examining the tubes next day we were surprised to find large numbers of active amoebae, morphologically indistinguishable from *E. histolytica*. As no vegetative amoebae were observed in the stool at the time of inoculation, it appeared that those present had originated from the cysts. Many similar

* A paper read in opening a discussion on amoebic dysentery in the Section of Tropical Diseases at the Annual Meeting of the British Medical Association, Edinburgh, 1927.