domestic and wild animals of varied species will certainly give comprehensive information on the relation of the incidence of cancer to the rapidity with which maturity is attained. Light may also be thrown on the reasons underlying the higher cancer-rate of later life.

For the same reason, exact observations on the age-incidence in the males and females of differing races of mankind among whom also maturity is arrived at, at varying ages, is desirable. A comparison of the age-incidence of cancer in men as contrasted with that in women who attain maturity more rapidly, might also be of value, for example, in India, where puberty is attained at an early age, and the child-bearing period stated to be over at, or about, the thirtieth year.

In the classification of "tumours" no marked advance has been made since Virchow, and on the basis of experience limited to mankind is not likely to be easy of attainment; but with the assistance of the extensive study of tumours in mammalia and other animals, it is reasonable to suppose that an advance would take place and a comparative natural classification be evolved.

Another specific problem—namely "deciduoma malignum," or "chorion-epithelioma"—seems to require consideration from the comparative biological standpoint, and to be more than a problem, merely of interest to obstetricians. It appears to be of great theoretical importance, and therefore it is much to be desired that those who have the opportunity will search for its possible occurrence, or for analogous processes in other mammalia among those with deciduate and non-deciduate placentae.

In cases where animals die after abortion or abnormal gestation, it would be very desirable if a necropsy could be made, and attention particularly directed to the uterus in order to discover, if possible, in other mammalia, anything analogous to the "deciduoma malignum" of mankind. If in any case an abnormal condition be detected, search should be made for secondary deposits in other organs.

It is only fair to point out that in indicating the extensive nature of the field of inquiry thus marked out, it has not been forgotten that the difficulties in attempting to carry it out will be very great indeed. It will involve the co-operation of workers in many professions, and in many trades and fields of scientific inquiry, and years of patient observation. A difficulty met with in mankind presents itself in animals in augmented form; cancer in animals is only likely to be recognized during life if it be situated on the visible, readily accessible, portions of the body; cancer of the internal organs is only likely to come rarely under observation at necropsies. Among aborigines it is probable that reliable data regarding cancer will be very difficult to obtain, except in those instances where there has been much contact with the white man.

A comparative study of the facts relating to the incidence of "cancer" in the animal kingdom would certainly enable us to orientate ourselves to an extent not likely to be attained through any other line of investigation. It is undesirable at present to speculate whether or not a common biological law applicable to the whole question, or a series of biological laws would be revealed.

Perhaps what has been stated may suffice to show that the prevailing pessimistic views as to the hopelessness of investigating cancer are unjustified in the face of what still remains to be done in this problem. Owing to the fact that cancer has hitherto been considered a subject which concerned only medical men, we are only at the very beginning of the work before us—surely the most inopportune occasion on which to regard it as hopelessly beyond our powers. For the accomplishment of the work to be done it is too much to require the mere medical man to do all in an investigation which extends far beyond the province of medicine into those of general biology, ethnology, zoology, and embryology. Is it too much to hope that workers in these fields will appreciate the importance of their share in attempts to ascertain the cause and nature of the malignant new growths of man and animals? What is most needed at present is a definition of the distribution of the various types of malignant new growths throughout the animal kingdom.

In conclusion, I should like to add that the ideas forming the basis of the above remarks have taken on a more definite form in consequence of much discussion with Dr. J. A. Murray.

THE second Congress of Italian Pathologists will be held at Florence on October 5th, 6th, and 7th.

AN EXPERIMENTAL EXAMINATION OF MESENTERIC GLANDS, TONSILS, AND ADENOIDS,

WITH REFERENCE TO THE PRESENCE OF VIRULENT TUBERCLE BACILLI.

BY

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THE experiments were primarily undertaken with a view to determine the presence or absence of virulent tubercle bacilli in the mesenteric glands of young children by an examination of suitable *post-mortem* material. The results, it was hoped, might furnish additional data with reference to the importance of the digestive tract as a channel for the entrance of tubercle bacilli into the system. The methods adopted were as follows:—The mesenteric glands on their removal at the necropsy were placed in a mixture of equal parts of glycerine and normal saline solution and conveyed to the laboratory. The material was tested in every instance by means of inoculation experiments. For this purpose a new method of procedure was adopted. The glands were freed as far as possible from the glycerine mixture, and were then disintegrated in a mechanical contrivance devised by Mr. Rowland for the purpose. It was considered that the method employed would facilitate the detection of the tubercle bacilli, and that it presented advantages over an ordinary emulsification, or a microscopic examination of the glands by the usual methods. If the organisms are sparse in number their physical presence may at times be overlooked. A thorough disintegration of the gland material will, on the other hand, tend to expose any organisms imbedded in recesses of the tissues and thus increase the chances of a successful inoculation experiment. In this respect the method appeared to us to approach more nearly to the conditions of an absolute test, and to be, therefore, the best adapted to the special purpose in view. The trituration of the glands was continued until the disintegration was so complete that a pulpy mass sufficiently fluid to be injected by means of a hypodermic syringe was obtained.

The disintegrating process lasted from half an hour to one hour, and every precaution was taken to carry it out under aseptic conditions, and to prevent any undue heating of the material. Of each gland thus treated, one half was injected subcutaneously, and the other half peritoneally into a guinea-pig. At the end of six to eight weeks any animals which had survived that period were killed and examined. The results were only considered positive in those cases in which tubercle bacilli were detected by microscopical examination of the lesions present in animals.

The *post-mortem* notes of the cases were furnished by the pathologist who had made the examination, and our thanks are due particularly to Dr. Cecil Bosanquet, to Dr. Fennell, and to Dr. Nabarro, whose aid rendered the investigation possible.

The *post-mortem* findings and the general results of the inoculation experiments are contained in the accompanying table. It only therefore, remains for us to give the inferences we have drawn from the results obtained. The total number of cases upon which the present paper is based is 28. We had hoped to increase the number, but unexpected difficulties arose in the way of procuring further material. The results, however, appear to be of sufficient interest to justify their being put on record.

The material examined was obtained as far as possible from cases of five years of age and under, as it is in such cases that a food infection would be most likely to occur. Only 2 cases were above 5—the one being about 6 and the other about 8 years of age. As regards sex, 16 were males, 9 females, and in 3 the sex was unrecorded. The examination for virulent tubercle bacilli was made irrespective of disease.

In none of the pathological reports was mention made of the detection of intestinal lesions. In the 28 cases the *post-mortem* diagnosis was as follows: Acute milary tuberculosis, 1; general tuberculosis, 4; tuberculous meningitis, 2; tuberculous broncho-pneumonia, 1; non-tuberculous or suffering from other diseases, 20. There was, therefore, existent tuberculous disease in 8 of the cases.

The animal inoculation experiments showed that virulent tubercle bacilli were present in the mesenteric glands in 10 of the 28 cases, 18 having given negative results. Of the

8 cases diagnosed as tuberculous, 5 gave a positive and 3 gave a negative result. The positive results estimated upon the total number of cases examined amounted to nearly 36 per cent. If the cases diagnosed as tuberculous are eliminated, it will be seen that 5 of the 20 non-tuberculous cases contained virulent tubercle bacilli in the mesenteric glands, and that in these cases the positive results were equal to 25 per cent.

As regards the other glands of the body examined, the following results were obtained: The bronchial glands gave a positive result in 1 out of 4 cases examined—namely, a case of general tuberculosis. The tubercle bacillus was found in the mesenteric glands, and likewise in the cervical glands of the same case.

As regards the 10 positive results obtained by inoculation experiments, the mesenteric glands were also examined microscopically in nine instances. Of the latter, in seven instances whilst the animal experiment was positive, the microscopic examination was negative.

TABLE.

No.	Sex.	Age.	Post-mortem Report.	Microscopical Examination of Glands.	Result of Inoculation.
1	F.	14 mths.	Old empyema; no obvious tuberculosis	Negative	Negative.
2	F.	4 yrs.	Tuberculous meningitis	Negative	Positive.
3	F.	7 mths.	Empyema; meningitis; gut normal	Negative	Negative.
4	M.	7 mths.	Acute diarrhoea; lobar pneumonia; no intestinal lesions	Negative	Negative.
5	F.	6 mths.	Pertussis; broncho-pneumonia	Negative	Positive.
6	M.	—	Broncho-pneumonia	Positive	Positive.
7	F.	9 mths.	Tuberculous meningitis; scattered grey tubercles in lung; caseous bronchial glands; no caseous glands round abdominal aorta	Negative	Positive.
8	M.	2½ yrs.	Multiple skin abscesses yielding staphylococcus pyogenes aureus only; thrombosis of cerebral sinuses	Positive	Positive.
9	M.	1 yr.	Broncho-pneumonia; no intestinal lesions	Negative	Negative.
10	—	1 yr.	Died suddenly; no intestinal lesions; nil found post mortem	Negative	Negative.
11	M.	4½ yrs.	Acute miliary tuberculosis	Negative	Positive.
12	M.	1 yr.	Tuberculous broncho-pneumonia	Negative	Negative.
13	M.	1½ yrs.	Measles; broncho-pneumonia	Negative	Negative.
14	M.	1 yr.	Broncho-pneumonia; no tuberculous lesions	Negative	Negative.
15	M.	4 mths.	Broncho-pneumonia; no tuberculous lesions	Negative	Negative.
16	M.	2 yrs.	General tuberculosis; tuberculous meningitis	Negative	Negative.
17	M.	1½ yrs.	Broncho-pneumonia; no tuberculous lesions	Negative	Negative.
18	M.	15 dys.	Wasting; jaundice; no tuberculous lesions discoverable	—	Negative.
19	F.	6½ yrs.	General tuberculosis	—	—
			Mesenteric glands	Negative	Positive.
			Bronchial glands	Positive	Positive.
			Left cervical glands	Positive	Positive.
			Right cervical glands	Negative	Positive.
20	—	1 yr.	Purulent cerebral meningitis	—	—
			Enlarged mesenteric glands	—	Negative.
			Gland from bifurcation of trachea	—	Negative.
21	M.	5 yrs.	General tuberculosis	Negative	Positive.
22	F.	Stillborn	—	Negative	Positive.
23	—	—	Septic meningitis	—	—
			Mesenteric glands	—	Negative.
			Right bronchial glands	—	Negative.
			Left bronchial glands	—	Negative.
24	F.	8 yrs.	Mitral and aortic disease	—	—
			Adherent pericardium	—	—
			Mesenteric glands	—	Positive.
			Right bronchial glands	—	Negative.
			Left bronchial glands	—	Negative.
25	M.	5 mths.	Intussusception	—	—
			Peritonitis	—	Negative.
26	F.	1½ yrs.	Empyema; septic meningitis	—	Negative.
27	M.	2 yrs.	Meningitis	—	Negative.
28	M.	4 yrs.	General tuberculosis	—	Negative.

The experiments have shown that in the non-tuberculous cases virulent tubercle bacilli were present to the extent of 25 per cent. The tubercle bacilli, it appears from these experiments, are present much more frequently in the mesenteric glands than ordinary *post-mortem* examination would lead one to suppose.

One point of interest to which we should like to draw attention was the detection by us of the tubercle bacillus in the mesenteric glands of a stillborn child.

As regards the other glandular tissues examined—that is

tonsils and adenoids—the material was obtained as the result of operations for the removal of the enlarged organs, and our thanks are due to Dr. Lambert Lack and the resident medical officer at the Throat Hospital, Golden Square, for the material. The ages of the patients varied from 2 to 21 years, all but 2 being under 17, and the majority under 11. The procedure adopted was the same as in the case of the mesenteric glands. Only those cases were counted in which the inoculated animals lived from one to two months. We were enabled to obtain results from 44 cases of adenoids and 34 cases of tonsils. As these tissues were diseased, it is a justifiable presumption that their power of resistance to the invasion of organisms was lowered, and that if virulent tubercle bacilli were not infrequently present in the throat, they would be found more particularly in situations such as those examined. The results, however, obtained have been entirely negative. In not a single case were there any naked-eye signs of tubercle, nor were tubercle bacilli found on microscopical examination of the organs of the experimental animals. We may therefore conclude that there are not usually present in the tonsils and adenoids tubercle bacilli capable of conveying the disease to that most susceptible animal, the guinea-pig. The virulent organisms found to be present in the tonsils and adenoids examined, belonged almost entirely to the group of the micrococci.

NOTE ON ANTIHAEMOLYTIC (HAEMOSOLIC) SERUM.

BY

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In a previous paper we showed that the serum of an animal (rabbit) which had received several injections of human urine became haemolytic for human red corpuscles. We next endeavoured to ascertain whether injections of bile would also produce haemolytic serum. For obvious reasons, we did not use human bile, but sterile ox bile, and tested the serum of the injected rabbit on the red corpuscles of the ox. All the experiments were conducted under conditions of absolute sterility.

Preliminary experiments confirmed the observation of others, namely, that the bile of the ox dissolved not only the red corpuscles of the ox, but those of other animals also—for example, the corpuscles of man, guinea-pig, rabbit, etc.—the haemolytic power, however, varying in different individuals. Similarly, the bile of rabbits is haemolytic for animals of other species as well as for the rabbit.

We now found that the serum of a normal animal possessed antihaemolytic properties against the bile of animals of the same species, and sometimes against the bile of other species. The washed red corpuscles of the ox, for instance, suspended in sterile salt solution are immediately dissolved on the addition of a sufficient quantity of ox bile, but are not dissolved if a certain quantity of ox serum be added at the same time. Similarly sheep's bile does not dissolve the red corpuscles of sheep suspended in sheep serum or in ox serum. Rabbit's serum has a very slight antihaemolytic effect against rabbit bile but none against ox bile.

The action produced by the same serum and bile differs according to the nature of the red corpuscles added to the mixture. Thus, a given mixture of ox bile and ox serum leaves the red corpuscles of the ox intact, whereas it dissolves the red corpuscles of the sheep and rabbit.

The subcutaneous injection of sterile ox bile (1 c.cm.) into rabbits is followed by local and general symptoms. The local symptoms often culminate in a more or less extensive patch of necrosis at the point of inoculation. The general symptoms are (1) a slight amount of fever and (2) temporary diminution of the red and white corpuscles of the blood. Should the quantity of injected bile be so large as to cause death, the *ante-mortem* temperature may fall several degrees below normal.

Intravenous injections of 1 or 2 c.cm. of sterile bile are not fatal, provided the bile be diluted with salt solution. The general symptoms produced by such intravenous injections resemble those following the subcutaneous introduction of bile.

The serum of a rabbit (weighing from 1 kg. 250 to 1 kg. 750)