substances makes it more and more apparent that genetic homogeneity is essential to most physiological work, and that genetic variety between strains provides an array of valuable tools for particular types of physiological experiments.

Summary

The use of inbred strains in biological research is essential for fixation of either phenotype, average grade, relative rank, or reaction to conditions. Examples are presented of each type of strain differences in mice, gleaned from 1951-3 literature and from research in the Inbred Nucleus of the Jackson Laboratory. These include differences in disease susceptibility, nature of disease produced by a given pathogen, survival time of infected individuals; capacity for antibody production, cold tolerance, reaction to specific toxins; sensitivity to and content of various hormones and reaction to endocrine extirpation; and differences in normal blood-cell levels, life-expectancy, and pathology pattern.

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The Singapore Anti-tuberculosis Association has recently published a well-illustrated account of the origin and activities of the Royal Singapore Tuberculosis Clinic, which has been in existence since 1948. In a foreword to the book the Right Hon. MALCOLM MACDONALD, Commissioner-General for the United Kingdom in South-east Asia, refers to the great increase in the work of the clinic, and continues: "Despite this attack, tuberculosis still remains a vast and dangerous problem in Singapore. Just how vast and how dangerous is still far from understood by the general population." The figures given in this book should dispel complacency. There may be as many as 50,000 patients needing treatment for tuberculosis in Singapore. Every day at the Royal Tuberculosis Clinic, which is a voluntary organization, some 20 new cases of tuberculosis are discovered—a steady 8 to 9% of those x-rayed each month. In all, nearly 60,000 radiographs are taken every year and 55,000 blood sedimentation tests performed. Between three and four thousand patients are under treatment at any one time, and in 1953 the total of patient attendances was over 150,000. The work of the clinic is carried on in two separate units, one for diagnosis and the other for treatment. There are no beds, but domiciliary treatment has proved remarkably successful, particularly among the Chinese. A children's clinic has now been started, where some 130 children a month are brought by their parents.

PELVIC TUBERCULOSIS

A REPORT ON 19 CASES

BY

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Morgagni (quoted by Norris, 1931), in the eighteenth century, was the first to recognize pelvic tuberculosis, but no further mention of the disease is found in the medical literature until 1831. Since that time numerous reports have appeared. The recent advent of streptomycin, P.A.S., and isoniazid has stimulated a new interest among gynaecologists.

The incidence of pelvic tuberculosis in the female is said to vary in different parts of the world. Sharman (1952), in Glasgow, and Rabau (1950), in Israel, have reported a high incidence of the disease in their respective clinics. I consider that pelvic tuberculosis in the Lebanon is more common than is generally believed, and this report is the first of its kind from that country.

Material

A review of the records at the American University Hospitals, Beirut, revealed 35 cases listed under the heading of pelvic tuberculosis for the seven-year period July 1, 1946, to June 30, 1953. However, a careful study of the case records shows that the diagnosis was established histologically in only 19 cases, and this study is confined to these 19 proved cases. The age incidence is shown in Table I.

TABLE I.—Age Incidence

Age	No. of Patients	Percentage
10-19	0	0
20-29	7	36.8
30-39	6	31.6
40-49	4	21.1
50-59	2	10.5
Total	19	100

Nulliparae, 8 (42%); average age, 28.6 years. Multiparae, 11 (58%); average age, 36.6 years.

During the same seven-year period there were 2,492 admissions to the gynaecological service of this institution. Thus the incidence of pelvic tuberculosis in these 2,492 admissions was approximately 0.8%. This is considerably lower than Leon's (1950) figure of 2% for all gynaecological conditions. Greenberg (1921) gives the incidence of tuberculous salpingitis among 24,155 gynaecological admissions to the Johns Hopkins Hospital as 0.83%.

Symptoms

Abdominal Pain.—The commonest symptom encountered in this series was low abdominal pain. This was present in 57.8% of the cases. Typically, the pain was of a dull nature, beginning in one of the lower quadrants and later being bilateral. Acute abdominal pain with fever simulating acute salpingitis or appendicitis has also been reported. Usually the attacks of pain became worse during the menstrual periods, but dysmenorrhoea *per se* was the admission complaint in only 15.8% of our cases. Backache was present in 27.4%.

Sterility.—The next commonest complaint was sterility (52.7%). It was primary in 42.2% and secondary in 10.5%. These figures are in sharp contrast to those given by Brown *et al.* (1953), who report it in only 6.9% of their cases. Greenhill (1951) states that tuberculosis is an infrequent cause of sterility, but in some parts of the world 5 to 6% of all endometrial biopsies performed on infertile women show tuberculosis. Sharman (1952) found histologically proved endometrial tuberculosis in 5.2% of 2,985 patients

with primary sterility. Liljedahl and Rydén (1951) state that among 499 women who were sterile the incidence of genital tuberculosis was 10%. During the seven-year period of this study 250 sterile women were admitted to the gynaecological service of the American University Hospitals. Ten of them were found to have genital tuberculosis, an incidence of 4%.

Fever.—This was usually of a low-grade nature and often unnoticed by the patient. It was present in nine cases (47.4%).

Leucorrhoea.—The discharge was usually not profuse and was of a watery character. It was found in seven cases (36.8%). Two patients reported the discharge as foul-smelling.

Ascites.—Swelling of the abdomen due to fluid, either in the past history or on admission, was present in six patients (31.6%). One patient also had a pleural effusion.

Menstrual Disturbances.—These may take various forms. In our series the commonest complaint related to the menses was an irregularity of the periods (27.4%). Amenorrhoea and menorrhagia had an incidence of 21.1% each. The amenorrhoea in these cases was the result of the general condition of the patient rather than infection in the genital tract. The incidence of dysmenorrhoea in our series, 15.8%, is lower than the figure given by Greenberg (62%).

Findings

Physical.—Bimanual pelvic examination often yields very instructive information in cases of pelvic tuberculosis. In 31.6% of our patients pelvic masses were felt unilaterally or bilaterally, usually the latter. However, a simple thickening, induration, or fixation of the adnexal tissues was just as common (31.6%). The fundus was found retroverted and fixed in 27.4%. In 15.8% of the patients the uterus was enlarged and the pre-operative diagnosis was myoma of the uterus. In three cases the pelvic findings were regarded as normal (15.8%). In one case the cervix was granulating, and bled easily on examination. Carcinoma of the cervix was suspected, but the biopsy revealed tuberculosis.

If one combines the cases diagnosed as myoma of the uterus with those in which the findings were normal, it will be seen that 31.1% of the patients had no indication of the presence of the disease.

Owing to the widespread use of antibiotics, the younger generation of gynaecologists rarely see the large tubo-ovarian masses of gonorrhoeal or streptococcal origin so often encountered in the past. The presence of such masses should nowadays arouse a suspicion of their nature.

Laboratory.—Once the diagnosis of genital tuberculosis is made, an x-ray examination of the chest should be made routinely. This was done in 13 of our 19 cases (68.4%), and evidence of healed or active pulmonary lesions was found in 7 (53.8% of those subjected to the examination). The total leucocyte count was below 10,000 in 11 patients (57.8%). When such a result is found in a febrile patient the possibility of tuberculosis should be strongly entertained. The differential count showed lymphocytosis (lymphocytes over 30%) in 27.4% of our cases. Anaemia as measured by an erythrocyte count lower than 4 millions was present in 42.2% of our patients.

Table II gives a comparison between our results and those of other authors.

Histological (Tables III and IV).—One or both Fallopian tubes were available for histological study in 10 cases, and all were found positive for tuberculosis. This illustrates the fact that pelvic tuberculosis is primarily tuberculosis of the tubes. Endometrial tissue was studied either by biopsy or from a uterus removed at operation in 13 cases. Tuberculous lesions were found in 11 (84.6%). The cervix was examined in five cases and found positive in two (40%). One or both ovaries were available in 10 cases, and lesions were found in two (20%). Both these were cases of tubo-ovarian abscess. The ovary is believed to be protected from

TABLE II.—Comparison of Our Statistics with Others

Finding	Present Series (19 Cases)	Brown <i>et al.</i> (1953) (158 Cases)	Greenberg (200 Cases)
Abdominal pain	57.8%	69%	80%
Sterility	52.7%	6.9%	60%
Primary	42.2%		
Secondary	10.5%		
Fever	47.4%	35.4%	62.5%
Leucorrhoea	36.8%	62.6%	72%
Backache	27.4%	10.1%	30%
Ascites	31.6%	21.5%	
Irregular periods	27.4%		
Amenorrhoea	21.1%	15.8%	6.5%
Menorrhagia	21.1%	20.2%	41.5%
Dysmenorrhoea	15.8%	8.8%	62%
Dyspareunia	5.3%	3.8%	
Positive chest x-ray film ..	53.8%	27%	
Leucocytes below 10,000 ..	57.8%	78%	+65%
Lymphocytosis	27.4%	24%	

Note.—Greenberg's 200 cases are all of tuberculous salpingitis only.

TABLE III.—Sites Affected

Site	No. of Cases	Percentage
Endometrium	11	57.8
Fallopian tubes	10	52.7
Peritoneum	4	21.1
Ovaries	2	10.5
Cervix	2	10.5
Myometrium	1	5.3

TABLE IV.—Relation Between Tissue Available for Histological Study and Percentage Positive

Tissue	No. Available	No. Positive	% Positive
Oviducts	10	10	100
Endometrium	13	11	84.6
Cervix	5	2	40
Ovaries	10	2	20
Myometrium	6	1	16.6

infection by its thick capsule of tunica albuginea. Lesions in the myometrium were found in only one of the six specimens examined (16.6%).

Peterson (1922) found tubal involvement in 86.3%, uterine in 50%, and ovarian in 43%. Tuberculosis of the vagina and vulva is extremely rare. This was absent in the present series.

Methods of Diagnosis

The diagnosis in all our 19 cases was established histologically. This is an ideal that cannot always be achieved. Since early diagnosis is desirable, and since tissue is not always available for study, other methods of establishing the presence of the disease have been devised. Apart from the history and the pelvic findings, the following measures are at the disposal of the gynaecologist:

1. **Diagnostic Curettage.**—According to Brown *et al.* (1953) 18.9% of cases are diagnosed by study of the endometrial curettings. Some investigators stress the danger of spreading the infection by curettage, and Sharman (1952) maintains that a single negative biopsy does not rule out the disease.

2. **Culture of Menstrual Blood and Cervical Mucus on Löwenstein's Medium.**—Kirchoff *et al.* (quoted by Greenhill, 1952) had positive cultures in 10 out of 19 cases of proved genital tuberculosis. In eight of the nine missed cases tubal but not endometrial tuberculosis was present. Furuhashi (quoted by Greenhill, 1952) believes that the most efficient way of diagnosing genital tuberculosis is by culture of the vaginal contents on several pre-menstrual days or of menstrual blood.

3. **Guinea-pig inoculation of menstrual blood.**

4. **Hysterosalpingography.**—Ekengren and Rydén (1950) have advanced detailed criteria for the radiological diagnosis of tuberculous salpingitis. A closer co-operation between the gynaecologist and the radiologist is necessary to achieve better results in this field.

Discussion

As stated at the beginning of this paper, 16 out of 35 cases were discarded because of the lack of positive proof of the diagnosis. Had we used some of the investigative measures outlined above we would undoubtedly have found a higher incidence of genital tuberculosis among our patients. In many of the 16 discarded cases there was strong presumptive evidence of the disease, and guinea-pig inoculation or culture of the menstrual blood would almost certainly have established the diagnosis in some.

Summary

Data of 19 cases of tuberculosis of the female genital tract investigated at the American University Hospitals, Beirut, are presented. The commonest complaints and physical findings are discussed and details of the histological findings in biopsy specimens analysed.

Pelvic tuberculosis is not rare. Its incidence among 2,492 gynaecological admissions to this institution is 0.8%. The diagnosis of the disease would be more frequently established if the measures outlined could be routinely used.

I wish to thank Dr. D. Homer Rea for permission to publish these cases and for advice on the preparation of this paper.

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Medical Memoranda

Extreme Fluid and Electrolyte Loss Due to Villous Papilloma of the Rectum

A case of a large mucus-secreting villous papilloma of the rectum producing extrarenal uraemia, acidosis, and dehydration as the result of severe diarrhoea is here described. Recovery followed treatment of the fluid and electrolyte loss and resection of the tumour.

CASE REPORT

A single woman of 57, who had previously been in good health, began in 1951 to have attacks of diarrhoea. She said that during the attacks she might pass as many as 20 motions a day, which were fluid and often colourless. At the start the attacks did not last longer than 48 hours, and then the bowel action might be normal for weeks. She never passed any blood. She gradually began to lose weight and strength, but never consulted a doctor. A week before her emergency admission to hospital in May, 1953, the diarrhoea became extreme with almost continuous rectal fluid loss. She also complained of paroxysms of severe pain in the back of the legs and in the abdomen. There was occasional vomiting. She did not remember the 18 hours previous to coming into hospital.

On admission she was moribund, and the immediate clinical impression was that she was in the terminal stage

of diabetic coma. There was intense acidotic breathing, and, from the flaccidity of the skin and the low eyeball tension, evidence of extreme dehydration. The tongue was dry and furred, the pulse feeble and rapid, and the systolic blood pressure only 60 mm. Hg. She was catheterized, but no urine was found in the bladder. A bowel action occurred which consisted of clear fluid apart from a few flecks of white mucus.

Her condition was so poor that she was not moved from the casualty examination couch. An intravenous infusion of normal saline was set up and 5 pints (2.8 litres) run in as fast as possible. Methylamphetamine, 30 mg. intravenously, was also given. Her condition immediately improved. She became conscious and the systolic blood pressure rose to 100 mm. Hg. She was then transferred to a ward and given a further 3 pints (1.7 litres) of normal saline intravenously during the night. The next morning she had improved greatly, and, as she was now able to drink, the drip was discontinued. Streptomycin sulphate, 0.5 g. four times a day, was given for three days. The stools on the first of these days continued to be fluid and frequent, but thereafter, over the next week, gradually became coloured and infrequent, although they were still fluid and contained mucus.

The day after admission the serum chemistry was as follows: blood urea, 205 mg. per 100 ml.; sodium, 295 mg. per 100 ml. (128 mEq/litre); chloride, 327 mg. per 100 ml. (92 mEq/litre); potassium, 15.8 mg. per 100 ml. (4.1 mEq/litre); CO₂ combining power, 25 vols.% (11.2 mEq/litre). A blood count showed: red cells, 5,960,000 per c.mm.; haemoglobin, 120% (17.8 g.%), white cells, 15,700, of which 82.5% were polymorphonuclears. The stools contained mucus, pus cells, occasional red blood cells, and macrophages, but no cysts, ova, amoebae, or *Giardia lamblia*. No pathogens were isolated in culture. The urine contained pus cells, red cells, and fairly numerous granular casts. There were no organisms. Twenty-four specimens of urine were collected, and, as might be expected, of the intake of 5 g. of sodium chloride daily the average output was 0.05 g. of chloride and 0.1 g. of sodium in 24 hours. In spite of this salt retention and unrestricted fluid intake the serum chemistry was very slow to return to normal.

Six days after admission the serum chemistry was as follows: urea, 155 mg. per 100 ml.; sodium, 275 mg. per 100 ml. (120 mEq/litre); chloride, 312 mg. per 100 ml. (88 mEq/litre); potassium, 16.2 mg. per 100 ml. (4.2 mEq/litre); CO₂ combining power, 40 vols.% (17.9 mEq/litre). Twelve days after admission it was: urea, 65 mg. per 100 ml.; sodium, 273 mg. per 100 ml. (119 mEq/litre); chloride, 324 mg. per 100 ml. (91 mEq/litre); potassium, 24.8 mg. per 100 ml. (6.4 mEq/litre).

She was placed on 15 g. of salt daily, and on the sixteenth day the blood urea had fallen to 28 mg. per 100 ml. The urine was free from albumin and there were no casts. The general appearance of the patient was quite normal.

There were never any abnormal findings on abdominal examination, but a soft mass was just palpable on rectal examination. On sigmoidoscopy a papillomatous growth of the pelvo-rectal junction was seen. The pedicle had a wide base. On attempting to pass the sigmoidoscope above the papilloma vision was obstructed by the rush of fluid faeces escaping from above. The rectal mucous membrane was quite normal. Histologically the biopsy specimen had the appearance of a villous papilloma.

Four weeks after admission Mr. B. N. Brooke opened the abdomen through a left paramedian incision. A large tumour was found in the lower sigmoid and the upper rectum, the rest of the colon being quite normal on inspection and palpation. The tumour was excised and an end-to-end anastomosis performed.

Post-operative recovery was uneventful and the patient was discharged ten days later. When seen subsequently she felt and looked well, and there was no complaint of diarrhoea.