quate carbohydrate was added to the diet. These observations illustrate the protein-sparing action of carbohydrate, later confirmed experimentally, among others, by Rubner, who was able to maintain nitrogenous equilibrium on 33 grams of protein as long as the total calories equalled 2,000 daily. This protein-sparing action is not possessed by fats when fed alone, though fat and carbohydrate mixtures function fully as well as carbohydrate alone.

The problem of protein malnutrition is not encountered only during war and famine. Practitioners meet it daily among poor and ignorant people, and perhaps almost as frequently among the opinionated and ignorant followers of some dietary faddist or commercialized diet racketeer. Suffice it to say, then, that problems of protein nutrition will arise under conditions causing an insufficient intake or inadequate absorption of the protein or other foods, whenever the protein loss is abnormally large or there is reason to suspect that increased destruction of protein is taking place, or whenever the body is unable to replace the broken-down protein with sufficient speed.

It will be readily apparent that the protein intake for normal nutrition and growth will vary with the age of the individual as well as with his size. Holt and Fales suggest 4 grams of protein per kilogram body weight up to one year of age, the requirement diminishing gradually, until at six years 2.6 grams per kilogram body weight is sufficient. The requirement may be more simply expressed as that protein contained in 2 ounces of milk (1.8 grams protein) for the first year, and thereafter 1.5 ounces of milk for each pound of normal body weight. Indeed this standard might be accepted as providing sufficient protein up to twelve, even fifteen years of age, when the requirements for growth diminish. During adolescence 0.9 ounces of milk should be adequate and 0.8 ounces thereafter would provide liberal protein for the adult.

Milk, however, as a permanent diet has many obvious disadvantages which these calculations have for the moment ignored. It should furnish 100 per cent of the protein for the first four months of life and 90 per cent of the protein for the remainder of the first year. For the next seventeen years, 30 ounces of milk (27 grams protein) should be supplied, and thereafter a minimum of 10 ounces of milk daily is desirable. This includes the amounts used in cooking. The remaining protein may be obtained from other sources, but up to six years of age the diet should contain at least two-thirds of its protein in the form of Grade A protein (meat, eggs, fish, fowl and dairy products). Thereafter, from 35 to 50 per cent of the protein intake should be Grade A, the remainder being derived from as wide a variety of sources as possible.

From the Table it is simple to ascertain the approximate protein sufficiency of a diet. Thus one serving each of milk, eggs, and roast beef, with three servings of bread, contain 1,100 calories and 54 grams protein, four-fifths the protein requirement of the average man, and over 70 per cent of it is Grade A protein.

THE CULTURAL REPRODUCTION OF CHROMIDIAL GRANULES IN MALIGNANT NEOPLASMS*

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In a previous communication (*Canad. M. Ass. J.*, 1937, **36**: 31) a description was given of the various types of granulation met with in the tissues of sarcomas and carcinomas as providing a basis upon which the structure of neoplasms could be correlated with clinical phenomena. It was suggested that such granulations should be assigned a major place in the process of neoplasia. Critical evidence in favour of such a theory would be to hand if it were possible to obtain such bodies in culture in a cell-free medium, for then the usual view that they are simply degeneration-products of nuclear breakdown would be set aside.

The study of over-living carcinoma tissue fresh from the operating room, either by the dark-field method or by the Zeiss polychromar, shows granules varying in size from that of "elementary bodies" upwards. Blood-cultures and cultures from the tissue also show the most minute bodies, but usually fail to demonstrate those of the kind found in the (so-called) necrotic parts of tumour tissue as shown in Fig. 1a (oil immersion view of the lumen of an acinus in a human adenocarcinoma). Fig. 1b interprets which granules are referred to.

The accompanying photographs are from cultures in which multiplication of various kinds of these bodies has taken place. Fig. 2a shows those isolated, and multiplying in a 16-day old blood-culture on tomato-broth, taken from a case of carcinoma of the thyroid during the operation. The irregular shadowing of the larger bodies is barely visible in the photograph, for which reason a companion sketch is placed against it (Fig. 2b). The budding forms are however easily made out. This is stained as for elementary bodies (carbol-fuchsin).

Fig. 3a presents an oil-immersion view of a section from mouse-sarcoma (strain dbrB from

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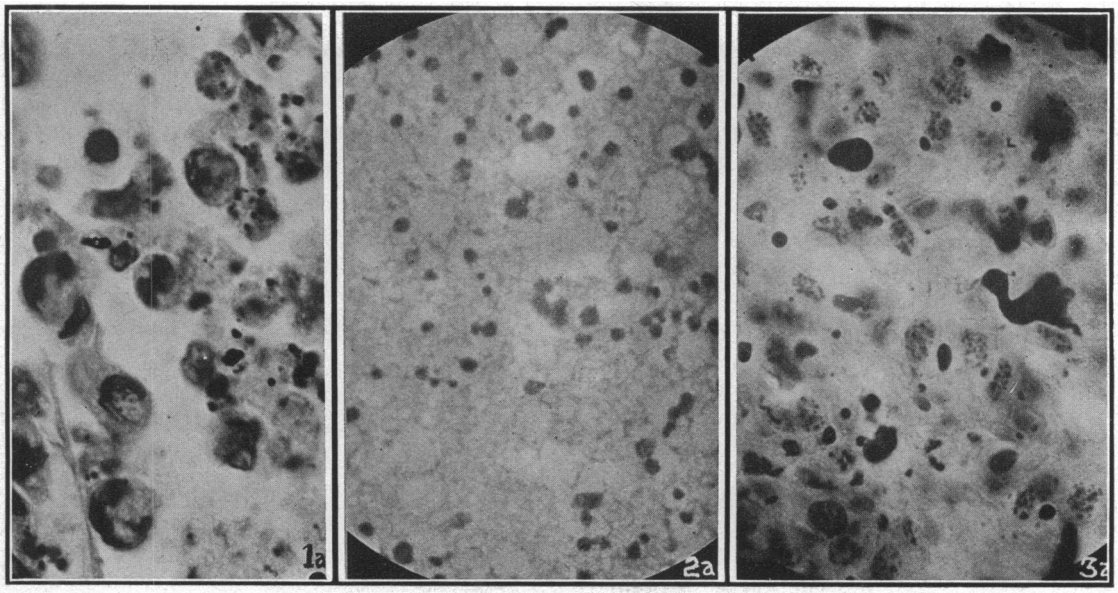
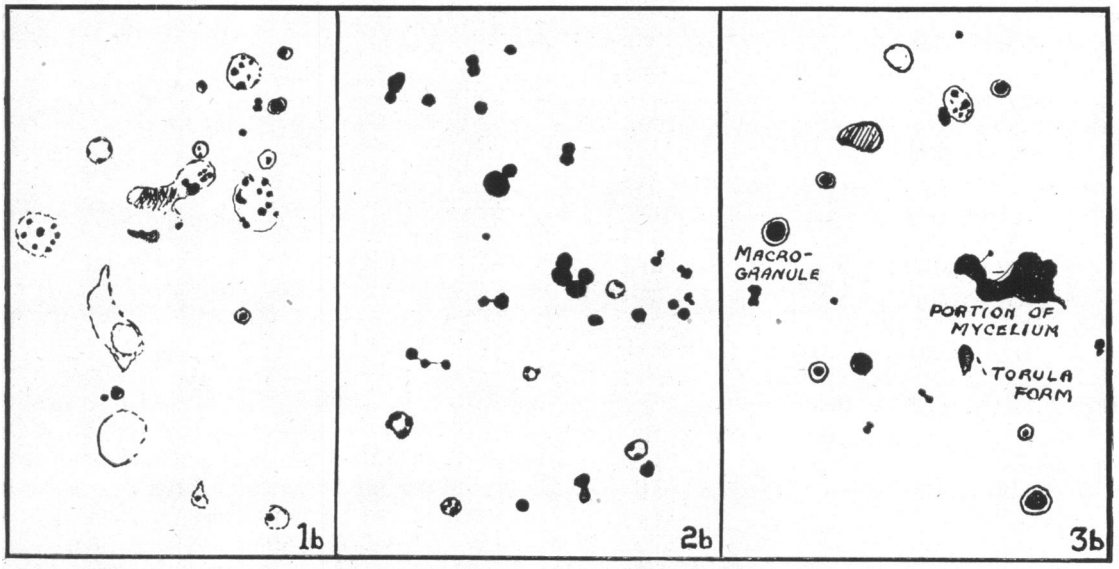
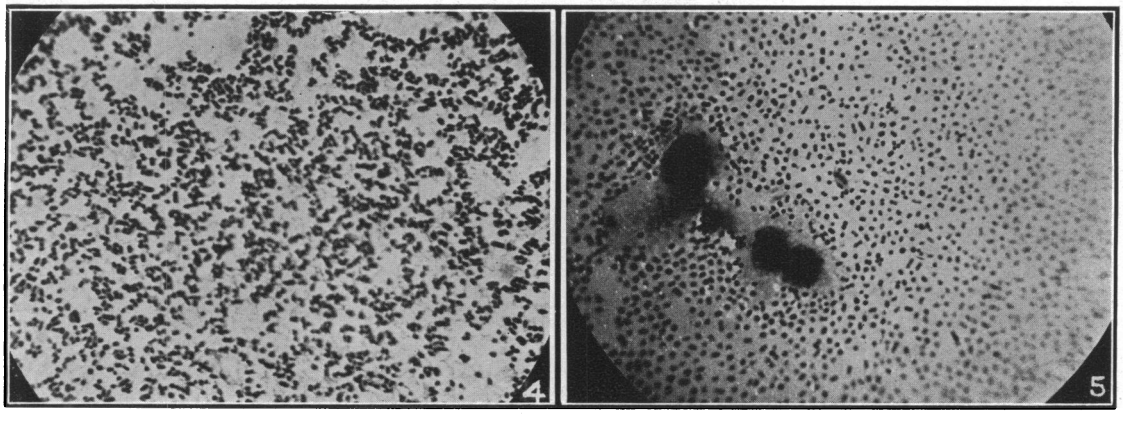

1a
2a
3a


1b
2b
MACRO-GRANULE
PORTION OF MYCELIUM
TORULA FORM
3b


4
5

Bar Harbour) showing several types of granulation in one field. The largest irregular mass is fungoid in character. (Gram-positive; red with safranin). The unstained over-living tissue was choked with minute granules, which were also obtained in pure culture as shown in Figs. 4 and 5, the magnification being 1,800 diameters, so that the granules are much smaller than the usual micrococci.

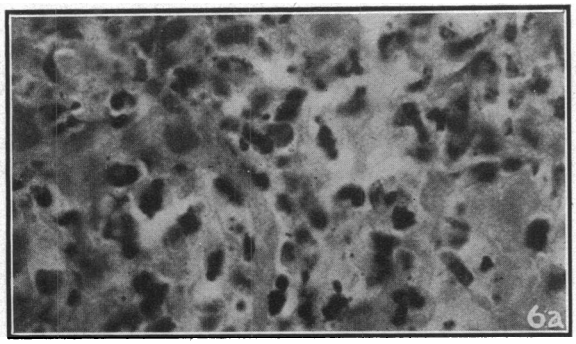


Fig. 6a

The view that chromidial granules are sometimes of exogenic origin (that is to say, are infective in nature) is also supported by the specimen shown in Fig. 6a, which shows a lesion in the liver of a rat which had been inoculated with a cryptomyces isolated from a case of human gastric carcinoma. Typical short fungal hyphæ are evident, besides the sharply defined round granules of various sizes. (Panchrom. stain; oil-immersion view). Budding forms are also numerous.

The different cultures show a pleomorphism recalling that emphasized in the cryptomyces originally reported.

To sum up, evidence is presented to show that the chromidial granules of various kinds which

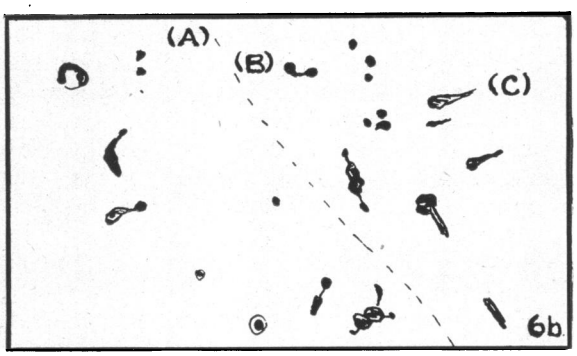


Fig. 6b.—A. edge of liver tissue; B. edge of lesion; C. fragments of hyphæ.

form a feature of most malignant neoplasms, both in the necrotic and non-necrotic parts, are not all degenerative-products but are viable organisms possessing reproductive power. The part which such organisms play in the neoplastic process is another question.

Men and Books

THE EARLY DOCTORS OF SOUTHERN ALBERTA*

BY HEBER C. JAMIESON, M.B.

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The settlement of Alberta was of so recent a date and took place in various districts under such particular circumstances that its early medical history can be sketched without difficulty. First fur traders in canoes, next missionaries in ox-carts, then the mounted police in the saddle, and later settlers by train played their part in opening up the country.

To the far north in 1776 came the intrepid trader, Peter Pond. Pushing his way beyond the trading posts on the prairie, he reached Lake Athabasca and established the first permanent settlement in the province, Fort Chipewyan. This fort for over a hundred years was the main depot of the fur business for the vast northland. The second centre originated on the North Saskatchewan. Fort Edmonton was built in 1795 to capture the trade from the Rocky Mountains. For nearly three-quarters of a century only the northern and central portions of the province were occupied by the few white men engaged in barter with the Indians.

In 1873 American fur traders, having invaded Alberta from Montana, were becoming a menace to the country by their unfair methods of bargaining and by their corruption of the Indians. These practices became so disturbing that the North-West Mounted Police was formed, sent west, and built forts at Macleod and other strategic points near the border. Their arrival brought peace and harmony to the tribes; settlers soon followed, and the southern ranges became dotted with cattle ranches. When the Canadian Pacific Railway entered the province in 1883 Medicine Hat and Calgary became divisional points and grew in population. Two years later Lethbridge was joined to the main line by a

*A paper presented to the Calgary Medical Association in March, 1936. Other papers by Dr. Jamieson on the early medical history of Alberta can be found in the *Journal*, 1929, **20**: 188; 1933, **29**: 431, and 1937, **37**: 388.