in the brain of sheep; allied forms occur mature in the dog and larval in the rabbit. *Echinococcifer echinococcus,* a minute form with only three to five proglottides, in dog, wolf, jackal. Larval stage a multilocular sac (fig. 11 B) with many scolices; found in man, ungulates, carnivores, rodents and monkeys.

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| *Table of Cestodes found in Man* | | |
| Species. | Larva. | Intermediate Host. |
| *Dibothriocephalus latus* (L.) | Plerocercoid | Pike, perch, trout, &c. |
| *Dibothriocephalus cordatus* (Leuck.) | Unknown |
| *Diplogonoporus grandis*  (Blanch.) | It |  |
| *Dipylidium caninum* (L.) . | Cysticercoid | *Trichodectes cants; Pulex serraticeps; P. irritons* |
| *Hymenolepis diminuata*  (Rud.) | Cysticercus | *Asopia far-*  *inalis*  *Anisolabis*  *annulipes* }Tnsecta  *Acisspinosa*  *Seaurus striatus .* |
| *H. nana* (v. Sieb.) . | Cysticercus | Insects and myria­pods  *Cyclops, Diaptomus* |
| *Drepanidotaenia lanceolata* (Bloch)  *Davainea madagascarensis* (Dav.) | Cysticercoid |
| Unknown | *...* |
| *Davainea (?) asiatica .* |  |  |
| *Taenia solium* (L.). | *Cysticercus cellu­losae* | *Sus scrofa* |
| *T. saginata* (Götze) | *Cysticercus bovis* | *Bos taurus* |
| *T. africana* (v. Linst.). | Unknown |  |
| *T. confusa* (Ward) . | »1  *Echinococcus* |  |
| *T. echinococcus* (v. Sieb.) . | Man and domestic |
| *veterinorum*  *E. multilocularis* | cattle, sheep, pig |
| *T. hominis (y.* Linst.) . | Unknown | ... |

Literature.—(1) Leuckart, *The Parasites of Man* (Edinburgh, 1886); (2) Braun, *The Animal Parasites of Man* (London, 1906); (3) *Id.,* “ Cestodes ’’ in Braun’s *Klassen u. Ordnungen d. Thierreichs,* vol. ii. (1894); (4) Shipley and Fearnsides, “ Effects of Parasites," *Journ. Economic Biology,* vol. i. No. 2, 1906; (5) W. B. Benham in Lankester’s *Treatise on Zoology,* part iv. 1901∕(6) A. E. Shipley and J. Hornell, Ceylon Pearl Oyster Report, London, The Royal Society, part ii. p. 77, part iii. p. 49, part v. p. 43, 1903-7; (7) W. B. Spencer ‘‘Gyrocotyle =Amphiptyches," *Trans. Roy. Soc.,* Victoria, vol. i. (1889); (8) S. Goto, “ Homology of Genital Ducts,” *Centralbl. f. Bact. u. Parasitenkunde,* vol. 14 (1893), P∙ 797; (9) Mrazek, “ Archigetes,” *Verhandl. d. böhm. Akad. Sci.* (Prague, 1897). Full references to further literature will be found in Braun’s works. (F. W. Ga.)

*Medicine.—*For practical purposes we have only three varie­ties of tapeworms to deal with as inhabitants of the human alimentary canal: *Taenia saginata,* the beef tapeworm; *Taenia solium,* the pork tapeworm; and *Dibothriocephalus latus,* the fish tapeworm. The first of these is prevalent in countries where much and imperfectly cooked beef is eaten, and where cattle in their turn are exposed to the infection of the tapeworm ova. Comparatively uncommon in Western Europe, the *Taenia saginata* is common in Eastern Europe, Asia and South America. It is calculated that in the North- West Provinces of India 5 per cent. of the cattle are affected with cysticerci owing to the filthy habits of the people. Measly beef (that infected with the *Cysticercus bovis)* is easily recognized. In Berlin the proportion of cattle said to be found infected on inspection in 1893 was 1 in 672. Cold storage for a period of over three weeks is said to kill the cysticercus.

The tapeworm most frequently found in man in Western Europe is the *Taenia solium,* which is constant wherever pork is consumed, and is more common in parts where raw or im­perfectly cooked pork is eaten. In North Germany the mature tapeworm was found on post-mortem examination once in every 200 bodies examined, while its embryo, the *Cysticercus cellulosae,* was found in 1 in every 76 bodies. In France, Great Britain and the United States the prevalence is not so great. The *Dibothriocephalus latus* is not generally found except in districts bordering the Baltic Sea, the districts round the Franco-Swiss lakes and Japan. In St Petersburg 15 per cent, of the in­habitants are said to be affected. The eggs are free in fresh­water lakes and rivers, where they enter the bodies of pike, turbot and other fishes, and are thus eaten by man.

In many instances the existence of a tapeworm may not cause any inconvenience to its host, and its presence may be only made known by the presence of the proglottides or mature segments in the stools. In the *Taenia solium* it takes 3 to 3½ months from the time of ingestion of the embryo to the passage of the matured segments, but in the *Taenia saginata* the time is only about 60 days. The segments of the *Taenia solium* are usually given off in chains, those of the *Taenia saginata* singly. In a number of cases there are colicky pains in the abdomen, with diarrhoea or constipation and more or less anaemia, while the *Dibothriocephalus latus* is capable of producing a profound and severe anaemia closely resembling perni­cious anaemia. The knowledge of the presence of the parasite adversely affects nervous people and may lead to mental depression and hypochondria. Nervous phenomena, such as chorea and epileptic seizures, have been attributed to the presence of the tapeworm.

The prophylaxis is important in order to limit the spread of the parasites. All segments passed should be burnt, and they should never be thrown where the embryos may become scattered. Atten­tion should be paid to the careful cooking of meat, so that any parasite present should be killed. Efficient inspection of meat in the abat­toirs should eliminate a large proportion of the diseased animals.

In the treatment of a case where the parasite is already present, for two days previous to the employment of a vermifuge a light diet should be given and the bowels moved by a purgative. For twelve hours previously to its administration no food should be given, in order that the intestinal tract should be empty so as to expose the tapeworm to the full action of the drug. The vermifuge is given in the early morning, and should consist of the liquid extract of felix mas, male fern, one drachm in emulsion or in capsules to be followed in half an hour by a calomel purgative. Castor-oil should not be used as a purgative. Pomegranate root, or, better, the sulphate of pelletierine in dose of 5 grains with an equal quantity of tannic acid, may be used to replace the male fern. In from 50 to 80 per cent. of cases the entire tapeworm is expelled. The head must be carefully searched for by the physician, as should it fail to be brought away the parasite continues to grow, and within a few months the segments again begin to appear.

**TAPIOCA** (a native Brazilian word), a farinaceous food sub­stance prepared from cassava starch, the product of the large tuberous roots of the cassava or manioc plant (see Cassava). Cassava starch, separated from the fibrous and nitrogenous constituents of the roots, is spread, while in a moist condition, upon iron plates, and with constant stirring exposed to such heat as causes a partial rupture of the starch granules, which agglomerate into irregular pellets, becoming hard and trans­lucent when cooled. In this condition the starch forms the tapioca of commerce, a light, pleasant and digestible food, much used in puddings and as a thickener for soups.

**TAPIR,** any existing representative of the perissodactyle section of ungulate mammals with five front and three hind toes, and no horn. Tapirs are an ancient group with many of the original characters of the primitive Ungulates of the Oligocene period, and have undergone but little change since the Miocene. On the fore-feet the four toes correspond to the second, third, fourth and fifth fingers of the human hand. The toes are enclosed in hoofs, and the under surface of the foot rests on a large pad. Tapirs are massively built, with short stout limbs, elongated head, and the nose and upper lip produced to form a short flexible trunk.

The five existing species may be grouped into two sections, the distinctive characters of which are only recognizable in the skull. (A) With a great anterior prolongation of the ossifica­tion of the nasal partition, extending in the adult far beyond the nasal bones, and supported and embraced at the base by ascending plates from the upper jaw, forming the genus or sub-genus *Tapirella.* To this division belong two species, both from Central America, *Tapirus bairdi* and *T. dowi.* The former is found in Mexico, Honduras, Nicaragua, Costa Rica and Panama; the latter in Guatemala, Nicaragua and Costa Rica. (B) With the bony partition not extending farther forward than the nasal bones (*Tapirtιs* proper). This includes three species, *T. indicus,* the largest of the genus, from the Malay Peninsula (as far north as Tavoy and Mergui), Sumatra