the other half ventrally.

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GLOCHIDIA (MOLLUSCA-PELECYPODA)

The term glochidium refers to the larval stage of unionid mussels parasitic on fish. It may, in a broad sense, also include the lasidia and haustorial larvae of muteloids of Africa and South America, though the form of larval parasitism in the two groups of mussels differs considerably (Fryer 1961, 1970).

The early development of the larvae takes place within the marsupia of female mussels. Upon discharge from the parent, they become encysted on gills, fins and skin of the fish where further development proceeds. During the parasitic stage, the larvae develop organs of the adult. Upon maturation, which takes three weeks to several months depending on the water temperature and certain other conditions, they fall to the substrate as young mussels.

Some representative types of glochidia and a lasidium and haustorial larva are illustrated in Figs. 75-80.

METHODS OF COLLECTION AND STUDY

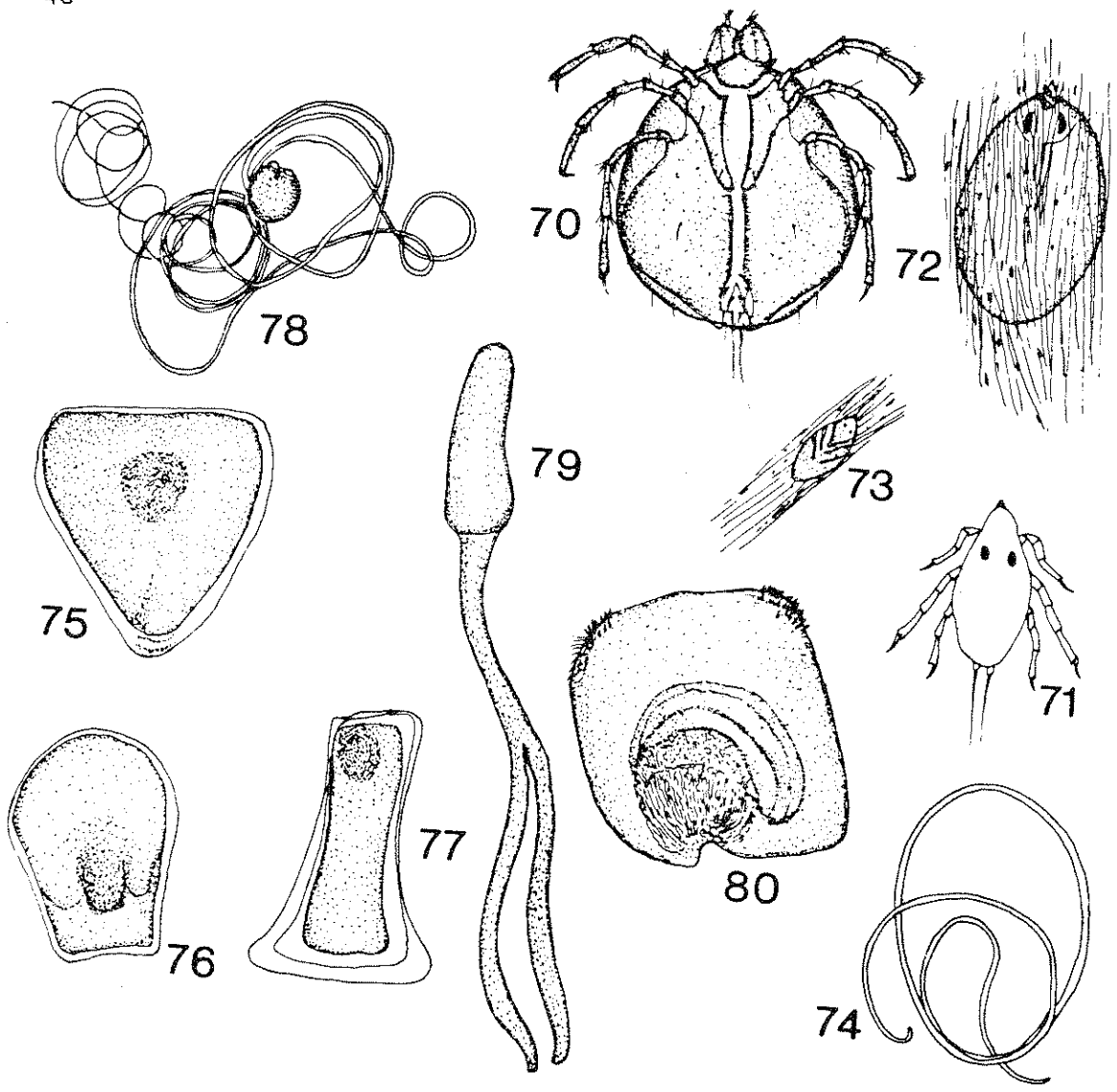
Glochidia on fish gills, fins and skin should be removed without any squashing or deformation of their shape, for size (maximum length and width) and shape are distinctive characteristics of species (keys to some North American species of glochidia are given by Surber (1921, 1915) and Baker (1928). The glochidia are best removed with some tissue. Where the tissue is sufficiently transparent, a temporary mount of the material may be made and the measurements taken. The tissue is then teased off with dissection needles and the glochidium is remounted for closer observation of hooks (if present), form of internal organs (visible through the shell) and the form of dots in the shell, all of which are additional distinctive characteristics of species.

The glochidia may also be studied as preserved material. The entire fish, if small, or pieces of infested gills and fins are placed in 10% formalin overnight for fixing and then preserved in 70% alcohol. They can be studied unstained or mounted in the stain mountant CMS-S(Turtox). The latter gives sharper detail of some morphological features.

For permanent slides, the dehydration process should be sufficiently slow to ensure complete dehydration of the internal organs encased by the shells. Incomplete dehydration of the internal organs will result in their becoming "charred" when placed in xylene, prior to mounting. This renders the preparation useless except for the study of size and shape. A generous supply of mountant (e.g. Canada balsam) should be used to avoid squashing of the specimen.

For glochidial material to be sectioned several fixatives, but particularly 4% neutral formaldehyde and Bouin's fluid, may be used. For staining,standard stains without counterstaining can be used.

The size of glochidia of a given species of mussel may vary with the habitat. The glochidia infesting river and lake fishes tend



FIGS. 70-80. HYDRACARINA, NEMATOMORPHA and GLOCHIDIA: 70. *Unionicola* larva (after Mitchell 1955). 71. Hydracarina larva from plankton. 72. and 73. *Unionicola* larva in muscle of stomach. 74. Nematomorpha (Hairworm), gross appearance. 75.-77. Glochidia of mussels (after Coker et al. 1921). 78. Lasidium larva of Muteloid mussel (after Fryer 1961). 79. *Mutela bourguinati* larva developing on gill surface. 80. Postparasitic juvenile following glochichal stage in the tropical unionid *Lamellidens*.

to be slightly larger than those infesting small stream fishes (Baker 1928). The identification keys at hand may thus merely indicate the closest species. However, the pre-parasitic and parasitic stages of many species of glochidia are nearly equal in size. The identification made can thus be ascertained by comparing the size of glochidia recovered from the fish to that of glochidia from gravid mussels of known species collected from the same area of study.

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ACCIDENTAL PARASITES

1. NEMATOMORPHA (Hairworms)

The mature worms of this group of animals occurs accidentally in a wide range of vertebrate hosts including man. They have a rather unusual life history. The adults are aquatic and do not feed but reproduce sexually. The eggs hatch into larvae capable of piercing the arthropod body surface but are sometimes taken in with food. The normal host is an arthropod and here the worm grows into the adult