At high temperatures, as, for instance, at 29° C., the rate of consumption was also high when the shoot was in darkness, but whether relatively rapid or not, the expected drop in rate took place during the first hour in light (following the hour of darkness). The high temperature, therefore, did not swamp the expected reaction during the light period.

As would be expected, the rate of transpiration was found to be greater during the exposure to sunlight than during the dark period. The ratio between the two (TL/TD) was found to be as much as 44:1. It is apparent, therefore, that a rapid rate of transpiration during the light period does not inhibit the fall of oxygen consumption of the root.

From what has been said it will be seen that the rate of oxygen consumption by the root of willow is indirectly affected by the light relations of the shoot, and may be directly affected by the temperature of the solution. There does not appear to be a positive relation between transpiration rate and that of oxygen absorption by the root. There may be a direct relation between the evaporating power of the air, as revealed by the B/W atmometer readings, and the rate of oxygen consumption. Whether, on the other hand, a high evaporation rate, in the willow at least, influences oxygen absorption by the root remains to be shown.

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SPROUTING AND GRAFTING FRACTIONAL PARTS OF AVOCADO EMBRYOS WITH ATTACHED COTYLEDONOUS MATERIAL

(1) SPROUTING OR GERMINATION

GROWTH responses following splitting in approximately equal parts of the avocado embryo, *Persea americana, P. drymifolia,* either before or after it has sprouted, and planting these fractions with attached cotyledonous material in a sawdust sprouting medium are of general scientific interest. Usually when the whole seed is planted, one sprout from the embryo takes the lead and dwarfs any secondary multiple sprouts which as a rule do not show above the ground. However, when the embryo was split into two fractions and these planted separately with attached cotyledonous material, in many cases, more than one sprout developed from each of the fractional parts of the embryo. These multiple sprouts were in many cases of equal strength. In some cases as many as eight sprouts were observed. It was desirable in the case of multiple sprouting to prune out all but one in order to secure in a reasonable length of time a plant suitable for budding. One-fourth embryos also sprouted and grew. These were secured by splitting half embryos, with cotyledonous material attached, into two portions. The application of this principle makes it possible to secure two or more plants from each avocado seed. An experiment to determine the relative vigor of plants from whole seeds and fractional embryos with attached cotyledonous material is now in progress.

(2) FRACTIONAL EMBRYO GRAFTING

The method of avocado propagation here briefly described is of general scientific interest in that it makes use of the principle of grafting a cion into either the sprouted or unsprouted fractional embryo. The seed is split in two, as reported above, and the cion is then wedge grafted into the fractional embryo with attached cotyledon at any of the three desired developmental stages: (*a*) immediately after splitting the unsprouted embryo; (*b*) after halves planted in sawdust just begin root and plumule elongation; (*c*) after the development of the fractional units has progressed still further—the root is 3 inches or more, and the plumule ½ to 1 inch or more, in length. In the last-named case, the plumule is cut back to point of union with the cotyledon. In a fourth method the whole seed is sprouted and then the developing embryo, including the plumule and tap-root which have reached the stage as indicated under (*c*) above, is split in half and each portion or split plumule is cut back to the point of union of the cotyledon and then grafted. The relative effectiveness of the four procedures has not been fully determined. After all the exposed cut surfaces are waxed with paraffin the completed grafts are placed horizontally with grafted embryo fraction on top, in a propagating medium, covered to a moderate depth (1½ to 2 inches) set in partial sunlight to provide solar heat, and watered liberally. When vigorous sprouts appear on the cion and additional roots have developed, the time varying with different experimental conditions, the grafts are transferred either to standard 12 by 6 by 6 inch cypress plant boxes or planted in the nursery row. When planted deeply, cion roots are formed in many cases.

The anatomy of the graft union and the physiology of growth are being studied. The chief difference between this and other methods of propagating the avocado, *Persea americana, P. drymifolia,* consists in grafting a cion into the sprouted or unsprouted fractional embryo at point of union with cotyledon, and not higher up into the developing plumule or stem. In this method the cion actually takes the place of the developing plumule. Possible advantages are bench operation in propagating, securing double the number of plants from the same number of available seeds and the production of satisfactory nursery trees

in a shorter time than by the usual shield budding method. A complete report will be published later.

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NEW DATA ON THE DEEP SEA FISH STYLOPHTHALMUS AND IDIACANTHUS

IN the course of intensive study of the Stomiatoid fish taken by the Tropical Research Oceanographic Expeditions of the New York Zoological Society off Nonsuch Island, Bermuda, we have come across several interesting facts well worthy of immediate record. These have to do with two families, *Stylophthalmidae* and *Idiacanthidae*. The former was erected by Brauer in 1906 to contain a single genus and species, since which time a number of uncertain forms have been described. The latter family was founded by Peters in 1876 and now contains a single genus and about five species.

In the course of 1,350 nets hauled in an eight-mile circle with its center at 32° 12′ No. Lat. and 64° 36′ West Long., nine and a quarter miles south-southeast of Nonsuch, Bermuda, we have taken 28 specimens of so-called *Stylophthalmus paradoxus* and 101 *Idiacanthus fasciola*. Four fifths of the very young stylophthalmine larvae were taken in a single haul at 100 fathoms, while all older stages came up from between 500 and 1,000 fathoms.

Recent study of these has led me to the following revision of the growth stages of both groups:

Stylophthalmus paradoxus represents the larva and post-larva of *Idiacanthus fasciola*, while the so-called post-larval stages of *I. fasciola*, characterized by enormous post-orbital light organs and the absence of pelvic fins and mental barbels, are in reality diminutive, larvoid, but sexually mature males. These males present extreme lengths of 32 to 45 mm, while the adult females in my collection measure from 60 to 270 mm. The numerical proportion of these dissimilar males and females is four to one.

In the collection of 129 individuals of this species there is represented every intermediate stage between stalk-eyed larvae from 16 to 45 mm, and sexually mature males and females, the latter up to 270 mm in length.

In addition to the above I have taken a number of short-stalked larvae, very similar to those assigned to *Stylophthalmus* by Brauer, which I refer without hesitation to *Argentinidae*, genus *Bathylagus*. Details of the transition from so-called *Stylophthalmus* to *Idiacanthus* will be presented in the course of the monographic treatment of the deep sea fish in the New York Zoological Society's *Zoologica*.

To summarize in brief, the optic nerve which runs the length of the enormously elongated eye-stalk of the larvae is gradually absorbed into the head, pulling the eye with it, more rapidly than the cartilaginous support of the stalk. This cartilage, while still attached to the eye-ball, is bowed down in an ever-tightening spiral, into a pre-ocular socket behind the nares. In this position the tight coil of cartilage is gradually covered with skin, and by late adolescence in both sexes is completely absorbed.

In conclusion, the chief differential characteristics of adult *Idiacanthus fasciola* of both sexes are as follows:

ADULT FEMALES	ADULT MALES
Color, brownish black	Color, dark brown or paler
No subdermal pigment spots	Subdermal pigment, as in larvae
Large fangs	Edentulous
Well-developed pelvic fins	No paired fins
Small postorbital light	Huge postorbital light
Well-developed mental barbel	No barbel
Well-ossified skeleton	Skeleton cartilaginous
Normal, black stomach	Digestive system quite degenerate
Normal ovaries	Testes enormous, occupying most of body.

In addition, the males have an external, apparently copulatory organ, equal in length to the diameter of the eye, and supported by the hollowed, specialized first anal ray.

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