



A pair of beautiful Jackknife fish, *Equetus lanceolatus*. George Vanik.

The Spawning And Larval Rearing Of The **JACKKNIFE FISH**

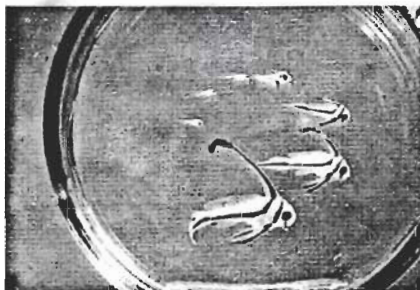
By Forrest A. Young

■ The Jackknife fish (*Equetus lanceolatus*) and the closely related members of the drum, or scienid, family are among the most spectacular fish, in form and color, that are available to the marine hobbyist. Unfortunately, many problems are associated with the handling and care of this group of fishes (highhats, spotted drum, and Jackknife fish). They are extremely delicate and, in many instances, require live foods, which can be overly time consuming for most aquarists. Often tank raised fish have,

shown much better adaptability to aquarium conditions and that end prompted our research at Aqualife Research Corp.

In nature, the Jackknife fish is secretive, often difficult and sometimes impossible to find. They are semi-tropically to tropically distributed in the western Atlantic and similar species are found in other warm seas of the world. According to Bohlke and Chaplin (1968) they are associated with relatively shallow coral and rocky rubble habitats in the Bahamas,

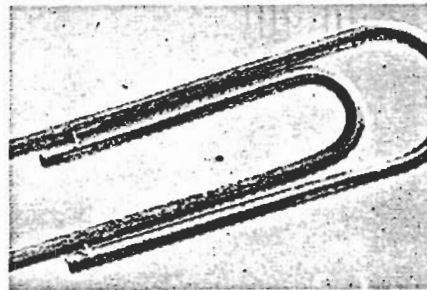
however in the Florida Keys I have found them inhabiting the shallow water grass flats (*Thalassia*) and gorgonian beds usually near a sponge or similar outcropping. Their striking color pattern is an example of both a disruptive and cryptic form of camouflage. Fish that are seen moving in a grass bed virtually disappear unless one pays close attention. My experience has also shown that the Jackknives are usually found in male/female pairs and sometimes two heterosexual pairs though other



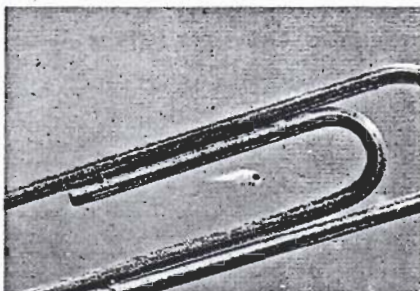
The circle of development.



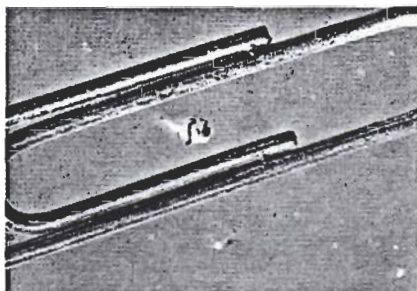
Newly hatched *E. lanceolatus*.



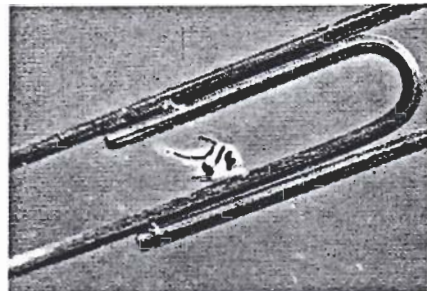
One day old Jackknife larvae.



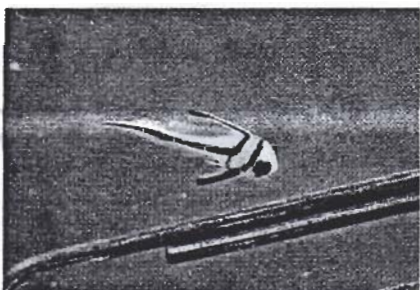
E. lanceolatus at three days.



E. lanceolatus at ten days.



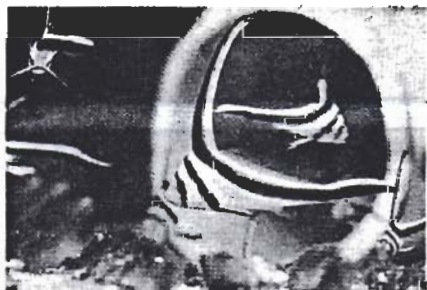
Twelve day old Jackknife fish.



E. lanceolatus at seventeen days.



E. lanceolatus at twenty days.



Four to six week old juveniles.

observers have reported vast schools of them in shallow grass flat areas (Straughan, 1973). They are also found in the passes and channels of the Florida Keys "back country" as well as in the offshore grass flats and gorgonian beds.

The first success in rearing Jackknives was attained in 1976 when Aqualife Research Corp., moved to the Florida Keys from St. Petersburg, Florida. The eggs were obtained from wild plankton tows and quite a few were reared through to the juvenile stage; but eggs from a wild source are, at best, unreliable so we set out to develop the techniques that would allow Jackknives to spawn in captivity. This work was delayed until the spring of 1979 when we could apply effort in finding the elusive brood stock.

Jackknife fish are pelagic spawners as are the other members of the genus *Equetus*. Straughan's (1973) account of a highhat strewing eggs in the sand was probably a case of the fish voiding itself of dead eggs that were not spawned. Viable eggs of pelagic spawners are always buoyant and float on, or near,

the surface of the water. The first spawn of our fish produced approximately one thousand eggs that were each a little over a millimeter in diameter. The developing embryos are rather unique in that they have very distinctive large white chromatophores that increase in size as the embryo develops. The eggs of the highhat are quite similar.

The eggs hatched in eighteen to twenty hours at 28°C and the rearing experiment began. The newly hatched larvae of most pelagic spawners have a short period of little or no motility and Jackknife larvae are no exception. This period, the prolarval stage lasted twenty-four to forty-eight hours and, during this time, the larvae utilized the nutrients in the yolk sac for growth and development. After the yolk sac is used up, the larvae has developed enough to swim actively and pursue and capture food organisms. The larvae have a bright orange abdomen at this point and strike at food organisms only in their near vicinity, so high food levels were needed to insure that food would always be present near them.

The larvae were voracious feeders and grew rapidly on their diet of wild and cultured planktonic organisms. The orange color gradually spread from the abdomen to the rest of the body and the black stripes slowly formed, and in about three weeks the transformation from larvae to juvenile was complete.

At this stage the Jackknives were moved from the larval tank to our running salt water grow-out system. Here they were acclimated to a variety of foods such as chopped shrimp, chopped conch, flake food, brine shrimp and other particulate food mixes. Randall (1967) and Lowe (1962, from Randall) found Jackknife fish to be entirely carnivorous. Randall's report indicated that 63% of foods eaten were shrimps, 31% were polychaete worms and 6% were crabs. Lowe found them to eat numerous small gastropod mollusks. Similar foods such as frozen and live adult brine shrimp and marine fish food mixes will be readily accepted. A diet rich in fats and oils must be avoided because the

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pH PROBLEMS?

From time to time it may be necessary to adjust the pH in your aquarium or in the water you add to it. When this time comes, use chemicals from the no nonsense company — ARL.

POTASSIUM DIHYDROGEN PHOSPHATE —
to decrease and maintain pH 4 oz. - \$1.99 8 oz. - \$2.99

SODIUM MONOHYDROGEN PHOSPHATE —
to increase and maintain pH 4 oz. - \$2.09 8 oz. - \$3.29

SODIUM BICARBONATE —
to increase pH 4 oz. - \$1.69 8 oz. - \$2.29

CHLORINE REMOVER WITH EDTA —
4 oz. - \$1.79 8 oz. - \$2.79


"An Introduction To Water Chemistry"
By Dr. Robert Halliday — \$2.00

Include \$.75 for postage on each item.
Send for price list.

Aquarium Research Laboratories
P.O. Box 373
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developed swim bladder. However, those fry which have gone through the "dry period" of three weeks do not seem to be bothered by the decreased incubation time. An occasional "belly slider" may be found, but most fry are completely normal.


So, our suggestion is to try one of the alternative media for a change of pace. You may never go back to peat moss, after getting fry in six weeks instead of six months. 

JACKKNIFE FISH

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fish's liver become saturated with oils and this, combined with stress, can easily lead to mortality. Many dry flake foods have high fat contents so should be fed sparingly. With attention to the proper diet, the aquarist can maintain and display this exotic and colorful fish with as much ease as other common marine tropical fish.

Literature Cited

- Bohlke, James E. and Charles C. G. Chaplin. 1968. Fishes of the Bahamas and adjacent tropical waters. Academy of Natural Sciences of Phila.
Lowe, R.H. 1962. The fishes of the British Guiana continental shelf. Atlantic coast of South America, with notes on their natural history. J. Linn. Soc. London, Zool., 44 (301): 669-700.
Randall, John E. 1967. Food habits of reef fishes of the West Indies. Studies in Tropical Oceanog. No. 5, U. of Miami Inst. of Marine Sci. pp. 665-847.
Straughan, R. P. L. 1973. First spawning of the highhat. Salt Water Aquarium. 9 (3): 23-24.
Straughan, R. P. L. 1973. The marine collectors guide. A. S. Barnes and Co. New York. pp. 107-109. 

GUPPIES TO GROUPERS

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multiply °C by 9/5 (nine fifths) and add 32:

$$25^{\circ}\text{C} \times \frac{9}{5} = 45^{\circ}$$

$$45^{\circ} + 32^{\circ} = 77^{\circ}\text{F}$$

The only language problems associated with filters is that of the **bacteria** discussions involved in articles about undergravel filters. I'm not referring to the Latin, genus or species names, just the type names. Notice that I always avoid the issue by using the phrase "good guy" bacteria for the desirable ones. Following are some terms you see in these articles. The only "good guys" are the nitrifiers

SHOW ANNOUNCEMENTS

SOUTH JERSEY TROPICAL FISH ASSOC. SPRING TROPICAL FISH SHOW

May 16, 17, & 18, 1980.
Echelon Mall Community Hall
For further info, call Jim Boyd, (215) 457-1370.

SINGING SANDS AQUARIST SOCIETY FINNY FROLICS '80 — OPEN SPECIES SHOW & AUCTION

May 2, 3, 4, 1980.
For further info, contact: Carl S. Denison, 701 Toronado Dr., LaPorte, Indiana 46350. Ph. (219) 326-0533.

OKLAHOMA CITY AQUARIUM SOC. NATIONAL SANCTIONED POINT SHOW

May 3-4, 1980
For further info, contact: Phil Byrum, 613 Bouziden Pl., Moore, OK.73160, (405) 799-6995.

EXOTIC AQUARIUM SOC. OF NEW JERSEY 14TH ANNUAL ALL SPECIES SHOW

May 3-4, 1980, Rochelle Park, N.J.
For further info, contact Chairman George Mood, 13 Matawan Terr., Matawan, N.J. 07747. (201) 566-6239. IBC Dist. Point Show.

WILLOWDALE AQUARIUM SOC. & TORONTO BETTA BUFFS

1980 C.A.O.A.C. CONVENTION & IBC DISTRICT POINT SHOW
May 16, 17, 18, 1980, Loews Westbury Hotel, Yonge St., Toronto, Ontario, Canada.
For further info, contact: Mrs. Nancy McKeraghan, 234 Dunview Ave., Willowdale, Ontario Canada M2N 4J2 (416) 223-4154.

HOUSTON AQUARIUM SOCIETY FISH SHOW AND AUCTION

April 12-13, 1980, Arboretum, 4501 Woodway, Houston, Texas.
For further information, call (713) 452-2051, or write Houston Aquarium Society, P.O. Box 525, Channelview, Texas.

OHAMA BETTA CLUB DISTRICT SANCTIONED POINT SHOW

May 17-18, 1980.
For further info, contact: Patti Ullman, 3560 Woolworth Ave., Omaha, Neb. 68105.

CLEVELAND AQUARIUM SOCIETY 1980 SPRING AQUARIUM BEAUTIFUL SHOW

April 27-May 3, 1980. WestGate Mall.
For further info, contact: Dan & Vi McMonigle, 3896 Boston Rd., Brunswick, Ohio 44212 (216) 238-8336.

GREATER PITTSBURGH AQUARIUM SOCIETY SUPER TROPICAL FISH SHOW III

May 2-3-4, 1980, Monroeville Mall.
For further info, contact: Jack Wilson, 902 W. Sutter Rd., Glenshaw, PA 15116. Phone (412) 486-9619.

INTERN. ASSOC. FOR AQUATIC ANIMAL MEDICINE ANNUAL MEETING

May 4-7, 1980, Vancouver, Canada.
For further info, contact: T.A. Gornall, Marine Animal Resource Center, 2201 34th Avenue West, Seattle, Wash. 98199.

SOUTHWESTERN MICHIGAN AQUARIUM SOCIETY SPRING AUCTION

April 27, 1980, Kalamazoo, Mich.
For further info, contact: Lyle Marshall, 11 E. Morgan St., Battle Creek, Mi. 49017, (616) 968-4791.

MID-WEST GUPPY CLUB 4TH INTERNATIONAL FANCY GUPPY SHOW

May 4, 1980, Hillside, Illinois.
For further info, contact: J. Johnson, (312) 257-9016.

AMERICAN KILLIFISH ASSOCIATION CONVENTION 1980

May 23, 24, 25, 1980, L.A., Cal.
For further info, contact, Sandy Binder, 4517 Fir Ave., Seal Beach, Calif. 90470, (213) 596-3519.

success with total water incubation for the Category II and III killies. Many have tried, and many have obtained good hatches, but most were "belly sliders." In other words, the fry were never able to leave the bottom of the container because of a poorly

then be placed for three weeks, on the just damp peat. This method allows a killie keeper to cut a normal incubation period of six months down to just six weeks. The one precaution is not to skip the "dry period" in the method. Very few killie keepers have had good