TABLE II
Gaseous contents, temperature and pH value of the medium

Serial No. of experiments as in Table I (*i*) from 1–12	Before the experiment						After the experiment						Remarks
	Gases c.c. per litre				Temperature	pH	Gases c.c. per litre				Temperature	pH	
	Carbon dioxide			Oxygen dissolved			Carbon dioxide			Oxygen dissolved			
	Free	Half bound	Fixed				Free	Half bound	Fixed				
1–2	1·769	23·257	23·257	5·23	73°F	8·2	5·561	22·752	22·752	·4206	72°F	7·4	Fish overturned and taken out
3–4	..	19·71	23·763	5·505	74°F	8·1	8·083	14·915	14·915	·686	75°F	7·2	Fish taken out
5 6	..	23·514	25·532	7·342	74°F	8·1	5·814	23 763	23·763	·229	74°F	7·3	Fish overturned and taken out
7–8	..	23·514	25·532	5·79	74°F	8·1	4·769	25·785	25·785	·274	72°F	7·5	Do.
9–10	..	19·71	23·763	5·505	74°F	8·1	1·769	23·257	23·257	·703	75°F	7·6	Fish quite comfortable and taken out
11–12	..	22·75	25·785	6·33	73°F	8·2	3·539	25·027	23·027	·371	74°F	7·3	Fish overturned and taken out

conducted in May, the temperature ranged from 82° F. to 87° F. The fry when introduced into the container were allowed to rest for five minutes because breathing was rapid in the beginning due to exertion as the fish darted from one corner to another before they settled down. Sufficient care was taken by the observer to be unnoticeable to the fish as a slight noise or movement would make the fish dart and strike against the container. A control was kept during the period of experimentation. The experiments were started at the same time each day.

RESPIRATORY MOVEMENTS

The rate of respiratory movements per minute in the two species is shown in Table I. The gaseous contents of the medium, its temperature and its pH value for the experiments when the temperature ranged from 72° to 75° F. are given in Table II. It was observed that the rate of respiration, when the temperature was low, was slow and the fish lived in the medium from 145 to 205 minutes. But when the temperature ranged from 82° to 87° F. the breathing, even from the commencement of the experiment, was quite rapid and most of the fish did not survive after 125 minutes and only a few lived upto 145 minutes.

The tests, further, showed that with the reduction of oxygen in the medium there was a gradual increase in the respiratory movements of the fish. With further decrease in the oxygen the movements showed a decline which ultimately ended in the suffocation of the fish. The fish, taken out of the container immediately when the fall in the respiratory movements was noticed, revived when put in fresh water, but those left in the container overturned and died.

It may, therefore, be said that upto a certain limit, *i.e.*, 0·686 c.c. p.l., dimunition in the dissolved oxygen in the medium is tolerated by the fish irrespective of cabon dioxide concentration, and its respiratory movements increase to compensate for the lack of oxygen. But when the oxygen is reduced to 0·229 to 0·371 c.c. p.l. in the medium the respiratory movements slow down and ultimately result in the asphyxiation of the fish.

Office of the Game Warden,
Punjab, Lahore, HAMID KHAN.
October 19, 1943. AMJAD HUSAIN.

1. Belding, D. L., *Trans. Amer. Fish. Soc.*, 1929, **59**, 238–45. 2. Hamid Khan, *Ind. Journ. Vet. Sci. Anim. Husb.*, 1940, **10**, 372–81.

GROWTH STAGES OF *LYSIOSQUILLA TIGRINA* NOBILI

THE present communication is a continuation of the studies on the Stomatopod larvæ of the Madras Coast already published in *Current Science* (Alikunhi and Aiyar, 1942, '43). *Lysiosquilla tigrina* Nobili is a very rare species, and to my knowledge is known only from the type specimen. Nobili obtained a single male specimen, 45 mm. long, from Santubong, Borneo, which was redescribed by Kemp (1913). The larvæ of this species are very rare as only two specimens could be obtained, one picked out from the preserved plankton of 14-3-1939 after an examination of seven years' plankton collections and the other obtained in the living condition from plankton of 3-3-1943. The latter developed into a female.

Final Pelagic Larva.—Total length including rostrum 13·5 mm., length of rostrum 4·3 mm., median length of carapace, excluding rostrum 4·5 mm., breadth of carapace in front of postero-lateral spines 2·3 mm., length of postero-lateral spine 3·2 mm., length of telson 1·3 mm., breadth of telson 1·7 mm.

Carapace slightly broader than the abdominal segments and extends over first abdominal. Antero-lateral corners smooth without any indication of the antero-lateral spines (Fig. 1*a*). Zoea spine absent. Rostrum long, with three ventral spinules. Tips of postero-lateral spines reach hind end of telson, each spine with a ventral spinule at base. Antennular peduncles short, flagella hardly reaching middle of rostrum. Eyes large with short eyestalks. Raptorial propodus with a short stout spine proximally. Dactylus has no free spines besides the terminal. 'Hands' of the third and fourth thoracic appendages large; that of fourth