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Lunar Rhythm in the Emergence of an Ephemeropteran

In a paper published in 1927, Hora¹ suggests that the swarming of some Ephemeroptera is related to the lunar cycle. Evidence has been obtained which suggests that *Povilla adusta* Navas, a mayfly widely distributed in Central and Southern Africa, shows such a rhythm of emergence in Uganda. The interest of this lies in the fact that very few examples are known of lunar rhythms in non-marine animals (see Caspers²).

It was suspected late in 1953 that adults (subimagines and imagines) of *Povilla adusta* appeared in large numbers only at about the period of full moon, and analysis of the dates of twenty-two swarms observed between March 1953 and April 1955 at Kaazi (twelve miles from Kampala) and Jinja, both on Lake Victoria, and on Lake Albert, shows that such swarms only occurred within five days of full moon, with the greatest number of swarms on the second night after full moon (Fig. 1). On three occasions swarms were recorded simultaneously at Jinja and Kaazi, which are fifty miles apart.

The adults come to light between 7.30 and 9.30 p.m. (East African Standard Time) and are not seen at other times: individuals only live for about one hour. A light-trap technique was therefore used when sampling at Kaazi during August 10-21, 1954. Of the 1,521 specimens obtained on these twelve nights, 680 (44 per cent) came on the second night after full moon (Fig. 2).

Examination of the specimens in the British Museum (Natural History) showed that fourteen specimens (some dating from 1900) were labelled with the date. Analysis of these dates and of the dates of three specimens recorded by Navas³ relative to full moon showed a different distribution in which there was no marked peak, which may perhaps be attributed to the following circumstances: (1) The records are of single specimens (except for one record from Lake Albert which relates to a swarm on the fourth night after full moon), and thus do not necessarily correspond to the peak emergence period. (2) The specimens are from localities ranging from 17° S. to 11° N.: it is possible that a lunar rhythm is only maintained near the equator, where the annual variation in day-length and temperature is low. The evidence for this is very meagre but, of the eight specimens the

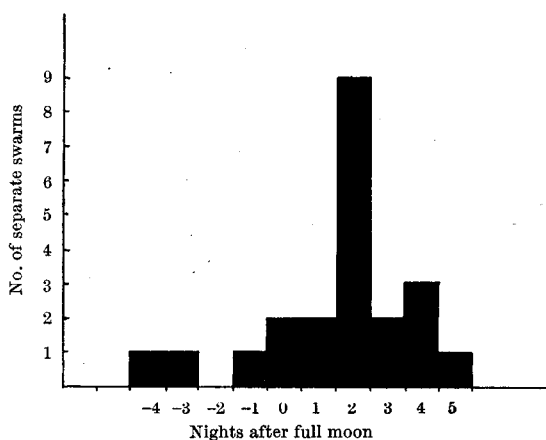


Fig. 1. Dates of twenty-two *Povilla* swarms relative to full moon

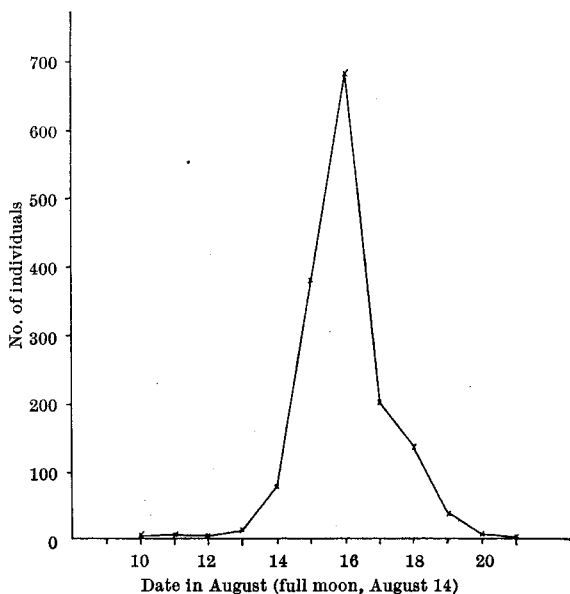


Fig. 2. Numbers of *Povilla* adults caught at Kaazi relative to full moon

dates of which fall outside the full-moon emergence period of eleven days, only one was caught in the field within 5° of the equator.

Experimental work has been limited by the

difficulty of keeping larvæ in the laboratory for more than two or three weeks, but some interesting results have been obtained and further work is in progress.

It has been found that the larvæ show a marked diurnal rhythm, remaining in their burrows during the day and swimming freely at night. This rhythm is maintained in darkness for at least two weeks.

Twelve adults have emerged in the laboratory from larvæ kept under various lighting conditions. Eight of these emerged within three days of full moon. Two emerged seven days before full moon when the aeration supply broke down. The remaining two individuals emerged eleven days before full moon, possibly having been influenced by being collected in the field the previous day.

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¹ Hora, S. L., *J. Asiat. Soc. Beng.*, N.S., 23, No. 3, 339 (1927).

² Caspers, H., *Arch. Hydrobiol.*, Supp.-Bd. 13, 415 (1951).

³ Navas, L., *Rev. Zool. Afr.*, 1, 401 (1912); 19, No. 3, 313 (1929); 21, 136 (1931).