persists in dead queens dried for more than 4 months. The responsible substance is removed by extraction in ethanol (Experiment 11) and ethanol extracts also attract workers (Experiments 12, 15, 16).

Although the attractive odour persists for months on dried queens, it soon disappears when ethanol extracts are evaporated on filter-paper (Experiments 13, 14, 16). Presumably, therefore, the attractive odour is only gradually released from a queen's body, where it is perhaps being retained by her body waxes.

Queen substance can also be extracted from queens' bodies in ethanol[17] but pure queen substance does not have an odour that attracts workers even when it is offered in relatively large amounts – i.e. certainly several times the quantity present on the body surfaces of ten mated queens together[18] – (Experiments 17, 18) and on a filter-paper surface several times larger than the combined surface areas of 10 queens (Experiment 17). It is clear, therefore, that queen substance is not responsible for the attractive odour. The nature and origin of the responsible substance is unknown; its odour probably serves to attract workers to a queen, and so helps them to find queen substance, but the substance does not itself inhibit queen rearing[1–3].

C. G. BUTLER

Rothamsted Experimental Station, Harpenden (Hertfortshire, England), May 18, 1960.

Zusammenfassung

Begattete und sogar getrocknete Bienenköniginnen haben einen für Arbeiterinnen anziehenden Geruch, der jedoch, mit einer Ausnahme, nur bei Darbietung von mehr als einer Königin demonstriert werden konnte. Der anziehende Geruch ist wie «Queen Substances» mit Alkohol extrahierbar, stammt aber nicht von der «Queen Substance». Die Herkunft der riechenden Substanz ist nicht bekannt. Der Königinnengeruch dient wahrscheinlich zur Anlockung der Arbeiterinnen und damit zur Erleichterung des Auffindens der «Queen Substance», die allein die Königinnenaufzucht zu verhindern vermag, wenn sie in genügender Menge vorhanden ist.

Pressure Perception in *Ostariophysi*

Concerning the site of pressure perception in the *Ostariophysi*, there is much controversy in the literature. According to some authors, the Weberian ossicles and the labyrinth play a major role in the perception of changes of hydrostatic pressure[1–3]; according to others, pressure perception is mainly localized in the swimbladder wall[4–8], where abundant nerve endings have been described histologically[9–13], or in the surrounding tissues. It seems likely that both principles are realized, each of them under its own circumstances[14]. The following observations add new evidence to this problem.

Among a number of blinded minnows (*Phoxinus laevis*) from which both mallei were removed, some were precisely equilibrated hydrostatically. These fishes stayed almost motionless in the middle of the water, thus offering good opportunity to observe even slight reactions to pressure change. For some fishes, pressure increase was used as a stimulus, while pressure decrease was applied to others. In both cases, spontaneous reactions occurred on pressure changes of only a few (4–7) cm of water pressure (rate of pressure change: about 70 cm/min). At each pressure increase, the fish showed a sudden, quiet ascend (downward beating of pectoral fins) over several cm. This response was always preceded by an interval of 5–8 sec without any visible signs of pressure perception or passive displacement. Frequently, the active ascent occurred without any observable rotation of the animal around a transverse axis; the fish body remained quite horizontal. At each pressure decrease, a similar reaction in the opposite direction was observed. These observations show that a blind minnow without functioning Weberian apparatus is still sensitive to pressure changes of a few cm of water pressure, and that the Weberian ossicles play no main role in the maintenance of hydrostatic equilibrium.

It has been reported that blinded minnows can easily be trained to react to slight pressure changes, both pressure increase and pressure decrease (rate of pressure change about 120 cm water/min[15]). Determination of a threshold has not been tried, but a pressure change of $^1/_2$–1 cm of water pressure evoked still a clear response (feeding reaction). After removal of both mallei, these reactions were abolished, even when the pressure increase used as a training stimulus was put up to 40 cm. When repeating these training experiments, we found in 7 blind fishes without mallei, after a long series of trials (at least 40 stimulus-punishment or stimulus-food combinations) positive conditioning (escape or feeding reactions, respectively) to a pressure increase or decrease of only 7–8 cm water pressure (total number of combinations: 1100). With a pressure change of 5–6 cm, the percentage of positive reactions went down to 50%, and this value is evidently close to the threshold, especially in the case of pressure decrease. The results of our training experiments, therefore, agree well with the conclusion drawn from our earlier equilibrium experiments.

Summarizing, we may conclude that in *Phoxinus laevis* the Weberian apparatus and the labyrinth play no main part in pressure perception underlying the maintenance of hydrostatic equilibrium.

Z. QUTOB

Laboratory of comparative Physiology, University of Utrecht (Holland), June 17, 1960.

Zusammenfassung

Blinde, malleuslose Elritzen beantworten unter günstigen Umständen schon Schwankungen von 4–7 cm Wasserdruck mit spontanen Reflexbewegungen. Druckzunahme löst – nach bestimmter Latenzzeit – Aufwärtsbewegung aus, Druckabnahme Abwärtsbewegung. Auch in langfristigen Dressurversuchen wurde entsprechende Reaktion auf Schwankungen bis zu 5–6 cm Wasserdruck erzielt.

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