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# PACEMAKERS AND ACTIVITY PATTERNS IN MEDUSAE: HOMAGE TO ROMANES FREE

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## Abstract

Romanes generalized conclusions concerning the coordinating mechanisms of jellyfish have been re-evaluated in the light of results obtained by the direct recording of nervous activity in both hydro- and scyphomedusae. In basic outline his deductions are confirmed, but he insufficiently recognized the important differences existing between the two classes. For example, the swimming-beat contraction in a scyphomedusan follows a single through-conducted impulse spreading from any marginal center across the appropriate nerve-net, whereas in the hydromedusae local pacemaker centers cause the muscular contractions, but their activities are coordinated by a through-conducted spike which has no direct effect on the muscles. Direct recording reveals a hydrozoan pattern of multiple pacemakers, superimposed conducting systems, cryptic activity, and regional autonomy in the hydromedusae which is very different from the greater simplicity of the scyphozoa. In the latter the direct responses of the marginal center pacemakers can now be understood with reference to the specific demonstrable interactions between the pacemakers and the two nervenets. In hydromedusae, however, the complexity that is disclosed demands further analysis of the ontogenetic changes in coordinating system function during the hydroid metamorphosis.

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