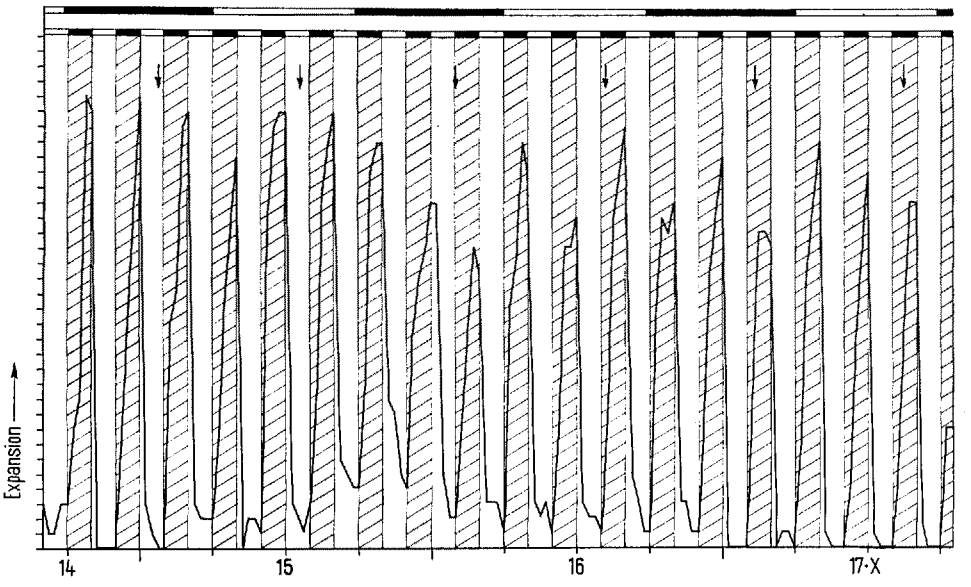

Fig. 1. Cumulative data showing the variation of the state of expansion of 10 specimens of *Actinia equina* L. in 3 successive days; 2:2 h light-dark conditions. Dark periods shaded. At the top, natural day and night. The arrows show the time of low tide on the coast. Abscissa: observation days. Ordinate: degree of expansion expressed in arbitrary units.

(3) *Tidal rhythm, continuous illumination of weak intensity.* The animals are expanded when immersed and closed when exposed. (4) *Tidal rhythm and nictemeral illumination.* The actiniae are fully expanded in the night at high water. (5) *Continuous immersion; weak continuous illumination.* The behaviour shows strong individual differences. Although the animals alternate with phases of expansion and contraction it does not seem possible to individualize any tidal or cyrcadian periodicity. (6) *Continuous immersion. 2 h of light and 2 h of darkness, alternately.* The ECR is adapted to the illumination conditions (Figure). The sea anemones follow the 4 h cycle, although they alternate with periods of minor or major reactivity.

We conclude that, at least for the Mediterranean population of *A. equina*, the cyrcadian and tidal rhythms do not continue in the laboratory. The behaviour of the animals seems to be directly controlled by external factors.

Riassunto. È stato studiato il ritmo di espansione-contrazione di esemplari di *Actinia equina* L. della zona intercotidale del Mar Tirreno, sottoposti a condizioni differenti di illuminazione e di livello d'acqua. Gli autori ritengono che il ritmo sia direttamente dipendente dall'illuminazione ambientale e dallo stato di copertura o scopertura conseguente alle maree. Una luce di intensità pari a quella lunare non esercita alcuna influenza sul ritmo.

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A New Finding about the Structure-Activity Relationship of Cardiotonic Steroids: Lack of Cardiotonic Action in 15α-Hydroxydigitoxigenin[1]

It is now fairly well established that there are certain structural features essential for the cardiotonic activity of cardenolides and bufadienolides. In most of these compounds, the essential features are: *cis*-fusion of the C and D rings, hydroxyl groups in positions 3β and 14β, and a five- or six-membered lactone ring having β-configuration at C_{17}[2].

Quite unexpectedly, however, the authors found that 15α-hydroxydigitoxigenin (15α-OH D-genin) did not show any cardiotonic activity, in spite of the fact that it retains all these essential features intact and just has another hydroxyl group at 15α position[3,4]. In this paper, the effect of this compound upon the heart contractile force will be described in comparison with that of digitoxigenin (D-genin).

Stock solutions of D-genin and 15α-OH D-genin were prepared, dissolving each compound in 70% ethanol in concentration of 1 mg/ml. Just before use, these stock solutions were diluted with Ringer's solution to desired concentrations in frog experiments, and with physiological saline to an appropriate volume in dog experiments.

(1) *Isolated frog's heart (Straub's preparation).* Impairment of the heart contractile force was induced by re-

[1] A part of the expense of this study was supported by a grant from Hoansha Research Fund.

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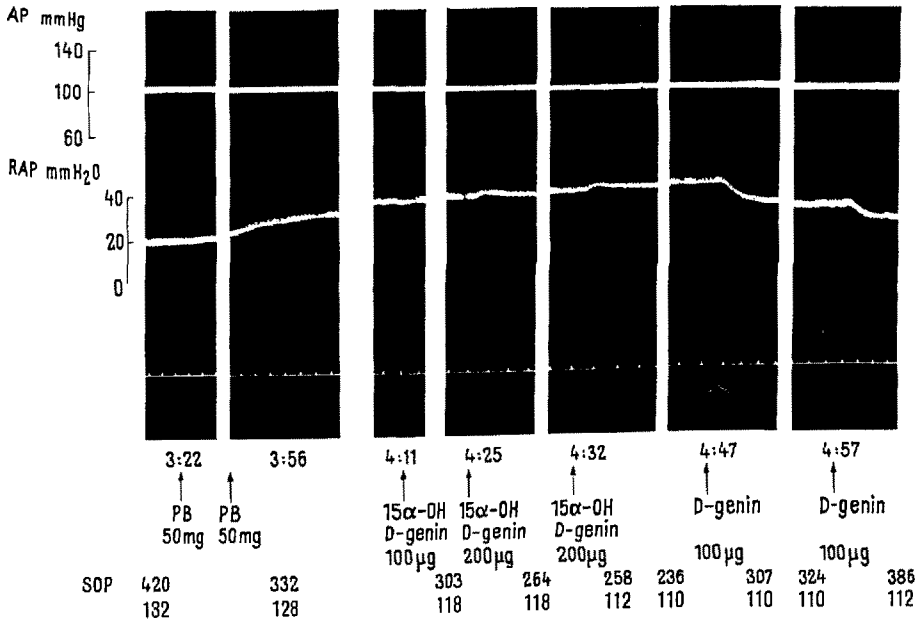

Effect of 15α-hydroxydigitoxigenin and digitoxigenin on the dog heart-lung preparation. The tracings are from top to bottom: arterial pressure (AP), right arterial pressure (RAP), systemic output recorded with a Weese stromuhr. PB = pentobarbital sodium, 15α-OH D-genin = 15α-hydroxydigitoxigenin, D-genin = digitoxigenin, SOP = systemic output in ml per min, HR = heart rate per min.

ducing the calcium concentration of the medium to half (0.8 m*M*). Under this condition, administration of 10^{-7} (w/v) of D-genin invariably produced an appreciable increase in heart contractile force. A higher concentration of D-genin showed a more remarkable effect and then caused a typical systolic arrest. In contrast, 15α-OH D-genin, even in a dose of as high as 10^{-5}, did not show any improvement in the heart contractility.

(2) *Heart-lung preparation of the dog.* In this preparation heart failure was produced by administering pentobarbital sodium. After a new steady state was reached, 15α-OH D-genin was injected into the rubber tubing leading to the venous cannula. As is shown in the Figure, even a cumulative dose of as high as 500 µg of 15α-OH D-genin could not produce any appreciable change in the heart contractile force. Then 100 µg of D-genin was injected *via* the same route. This caused a marked decrease in right atrial pressure and an increase in systemic output.

The results of these experiments suggest that the hydroxyl group introduced into 15α position somehow interferes with the stereochemical arrangement in the vicinity of the C and D rings, depriving the cardiotonic activity of the resulting compound[5].

Zusammenfassung. Es wurde die inotrope Wirkung von 15α-Hydroxy-Digitoxigenin am isolierten Herzen des Frosches und am Herz-Lungen-Präparat des Hundes untersucht. Abweichend von Digitoxigenin hat das 15α-Hydroxy-Derivat keinen Einfluss auf die Kontraktionskraft dieser Präparate.

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[5] 15α-OH D-genin used in this study was generously supplied by Dr. Masashi Okada of the Tokyo Biochemical Institute, Tokyo (Japan).

Canthaxanthin als Sekundär-Carotinoid einiger Grünalgen

In vielen Fällen ändert sich die Pigmentgarnitur von Grünalgen bei Nährstoffmangel, besonders bei Fehlen von Stickstoff[1]. Die dabei gelegentlich auftretenden Sekundär-Carotinoide sind mehrfach untersucht[1,2] und bei der Gattung Chlorella auf ihre Bedeutung als taxonomisches Merkmal geprüft worden[3]. Astaxanthin konnte als eines dieser Pigmente eindeutig identifiziert werden[1].

Während Untersuchungen über die Nitratreduktion[4] und über die Wirkung von Chloramphenicol auf die Farbstoffgarnitur einiger Grünalgen[5] standen uns grössere Mengen an N-Mangel-Algen zur Verfügung und boten uns Gelegenheit, weitere Pigmente genauer zu charakterisieren. Bereits Dersch[1] beschrieb ein auf Grund seiner Absorp-

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