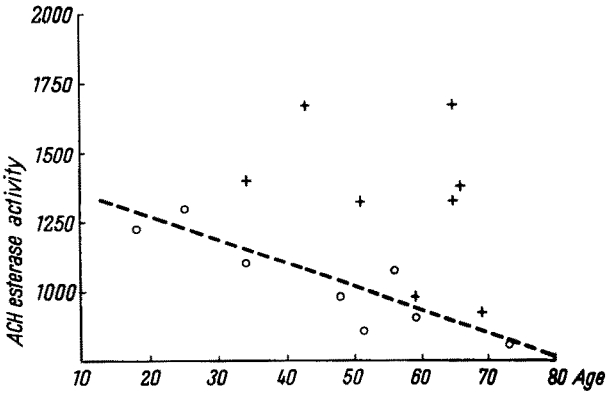
was applied and the difference between males and females was then significant on the level of $P < 0{\cdot}01$.

LACASSAGNE[2] found histological differences between the male and female submaxillary glands from rats. He was also able to change the appearance of the structures by injections of sex hormones. It is therefore possible that the difference in enzymic activity in human male and female parotid glands is due to sex hormonal influence.



The Figure shows the acetylcholine splitting activity (ordinate) plotted against the age (abscissa) for male (+) and female (o) parotids. The regression line for female glands ($k = -0{\cdot}334$) is drawn.

Since usually only a small part of the gland was obtainable, it was thought of interest to know whether any differences found between glands could be due to differences in activity in different parts of the gland. This possibility was tested in cases where much tissue was at disposal. The tissue was divided into several pieces and the activity of each estimated. It was found that the results obtained with different pieces from one gland were very similar. One, almost whole, parotid gland, for example, was divided into 16 parts and the acetylcholine splitting activity was estimated. The standard error in this series was $\pm$ 2·1 %, that is of an order which might be due to the error of the method used. Thus the cholinesterase in parotid glands seems to be evenly distributed. The activity was about the same in human parotid and submaxillary glands (see Table). In the cat, the activity in the submaxillary gland is about double that of the parotid gland (STRÖMBLAD[1]).

B. C. R. STRÖMBLAD

Institute of Physiology, University of Lund (Sweden), May 25, 1959.

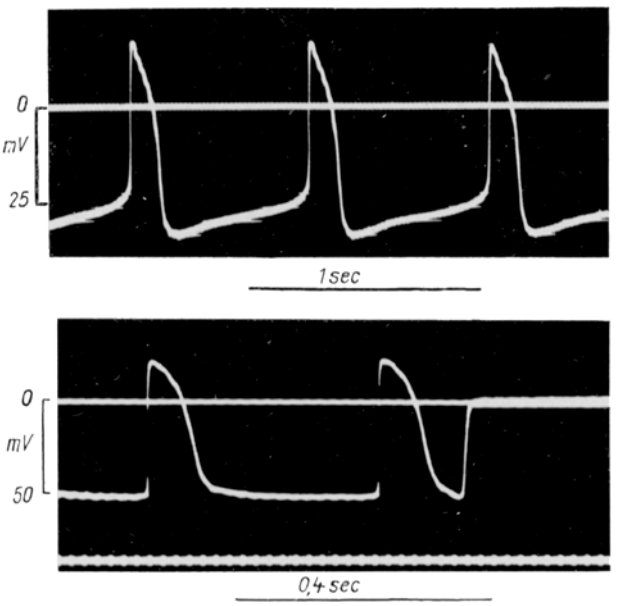
Zusammenfassung

Operativ frisch entnommene menschliche Speicheldrüsen (Submaxillaris und Parotis) zeigen Cholinesteraseaktivität. Hauptsächlich werden spezifische Esterasen gefunden. Die Aktivität der männlichen Parotis ist höher als die der weiblichen. Letztere zeigt eine Aktivitätsabnahme mit zunehmendem Alter.

[2] A. LACASSAGNE, C. R. Soc. Biol. *133*, 180 (1940).

Early Functional Differentiation of Heart Muscle Cells[1]

Tissue cultures from heart muscle cells contract spontaneously. According to FÄNGE *et al.*[2], all cells show an electrical behaviour characteristic of pacemaker regions, the so-called prepotentials. The pacemaker properties are evident even if the material is taken from parts of the embryonic heart that would differentiate into ventricular tissue, provided the embryos are younger than 192 h (8 days). The question arises whether *in vivo* all heart fibres at an early stage of differentiation show pacemaker activity[3].



Upper record: transmembrane potential of sinus region of a 42-h old chick embryo. Lower record: transmembrane potential of cardiac tube (future ventricle)

Fertile chick eggs, incubated for 37 to 67 h at 38°C, were used. The yolk was removed by suction under warm Locke's solution. The embryo, with intact area vasculosa, was transferred to a Perspex chamber. This contained Locke's solution thermostatically controlled at 37°C and aerated with oxygen (95%) and CO_2 (5%). With the help of a binocular microscope, the membranes overlying the heart were dissected, and a single muscle fibre was impaled with a glass capillary microelectrode (tip < 0,5 µ).

The potential difference between the microelectrode and an indifferent electrode was applied to a cathode-follower with a low grid current[4], amplified, displayed on a cathode ray tube and recorded on moving film. The second beam of a dual beam scope was used to indicate the level of zero potential difference. Embryos from successful experiments were kept in order to check their age and to measure the diameter of their cardiac fibres.

[1] Aided by a grant from the Italian 'Consiglio Nazionale delle Ricerche'.

[2] R. FÄNGE, H. PERSSON, and S. THESLEFF, Acta Physiol. Scand. *38*, 173 (1957).

[3] See also the comparative physiological researches on the isolated embryonic fishheart by HJ. HUGGEL (Z. vgl. Physiol. *42*, 63 (1959)), which showed by the ligaturemethod the early development of pacemaker activity.

[4] E. MEDA, Arch. Fisiologia *58*, 404 (1958).

Amplitude of Prepotential, Membrane Potential and Overshoot of Embryonic Chick Sinus Venosus and Ventricle (37°C).

n = number of measurements; $\bar{m}$ = mean; σ = standard deviation

Exp. No.	Age in h	So-mites		Prepotential mV (n) $\bar{m} \pm \sigma$ (range)	Membrane resting potential mV (n) $\bar{m} \pm \sigma$ (range)	Overshoot mV $\bar{m} \pm \sigma$ (range)	Action Pot. durat. sec. $\bar{m} \pm \sigma$	Mean heart rate per min
1	37	9	Ventr.		(7) 51·6 ± 0·00 (51·0 – 53·0)	20·5 ± 0·46 (12·8 – 21·2)	0·214 ± 0·01	130
2	42	13	Sin.	(41) 8·3 ± 1·49 (3·8–11·1)	33·3 ± 8·38 (19·1 – 41·0)	20·2 ± 6·55 (9·5 – 27·7)	0·193 ± 0·09	124
			Ventr.		(28) 31·0 ± 1·42 (27·5 – 33·9)	25·7 ± 1·67 (21·3 – 27·6)	0·249 ± 0·01	106
3	43	15	Sin.	(80) 6·7 ± 1·95 (4·1–11·0)	37·6 ± 7·46 (28·8 – 51·0)	11·3 ± 5·00 (5·0 – 21·2)	0·136 ± 0·005	131
			Ventr.		(32) 42·0 ± 2·79 (37·0 – 44·6)	30·1 ± 1·34 (2·90 – 3·22)	0·177 ± 0·006	151
4	46	16	Sin.	(15) 12·7 ± 1·83 (9·3 – 14·9)	37·4 ± 3·90 (32·6 – 41·7)	17·7 ± 3·50 (16·0 – 24·1)	0·194 ± 0·003	152
			Ventr.		(5) 33·6 ± 1·03 (32·5 – 34·4)	11·2 ± 0·53 (10·9 – 12·1)	0·166 ± 0·01	182
5	49	19	Ventr.		(21) 37·3 ± 7·61 (26·8 – 48·4)	16·5 ± 6·38 (8·9 – 22·8)	0·098 ± 0·003	157
6	67	30	Sin.	(10) 4·5 ± 0·59 (3·7 – 5·6)	26·7 ± 2·48 (23·7 – 29·2)	7·2 ± 0·32 (7·1 – 7·6)	0·066 ± 0·003	104
			Ventr.		(12) 27·3 ± 3·62 (22·5 – 31·6)	9·2 ± 0·75 (9·0 – 10·5)	0·121 ± 0·008	139
		Mean	Sin.	(146) 8·05 ± 2·46	33·7 ± 8.54	14·1 ± 6·79	0·161 ± 0·012	138
			Ventr.		(105) 37·1 ± 7·62	18·8 ± 8·71		

The upper record of the Figure shows trans-membrane potentials recorded from the sinus venosus of the heart tube: there is a gradual decrease of membrane potential preceding the upstroke of each action potential. In fibres adjacent to the sinus region, these prepotentials were smaller and their slope was more constant.

The bottom record shows trans-membrane potentials of the same embryo, from a region which, in the future, would become ventricle: there is no prepotential. On a few occasions, the records showed waves of depolarization which were small in amplitude (1–3 mV) and never gave rise to action potentials. The two different types of trans-membrane potentials shown in the Figure were also obtained from embryos as young as 37 h.

The quantitative data are summarized in the Table. Values are separately tabulated for sinus and for ventricle. With respect to resting potentials and overshoots, they are not statistically different. The large scatter and relatively low means, particularly for the resting potential, are thought to be connected with the small dimensions of the embryonic heart cells. The average diameter was μ 4·8 ± 0·76 in cardiac tissue taken from a 37 h embryo.

The present experiments made it clear that there is a differentiation at an early stage of development: cells of the sinus region show prepotentials resembling those of adult pacemaker[5–7]; cells of the cardiac tube (future ventricles) show an electrical behaviour similar to that of adult ventricles[6]. From the findings of FÄNGE *et al.*[2] and the present results, it also follows that prepotentials appear (or re-appear) if cells of the heart tube are cultured *in vitro*.

E. MEDA and A. FERRONI

Istituto di Fisiologia umana della Università di Torino (Italia), July 28, 1959.

Zusammenfassung

Von embryonalen Hühnerherzen wurden *in vivo* Membranpotentiale verschiedenen Regimes registriert. Bereits auf sehr frühen Entwicklungsstadien (37 h) wird eine Differenzierung in Schrittmachergasern und spätere Ventrikelfasern gefunden.

[5] S. WEIDMANN, J. Physiol. *115*, 227 (1951).

[6] S. WEIDMANN, *Elektrophysiologie der Herzmuskel faser* (H.Huber, Bern 1956).

[7] O. HUTTER and W. TRAUTWEIN, J. gen. Physiol. *39*, 715 (1956).

Die Wirkung von Harmalin auf die Konzentration von Noradrenalin und Adrenalin im Herzen

Harmalaalkaloide gehören zu den wirksamsten Hemmstoffen der Monoaminoxydase *in vitro*[1]. Mit Harmalin wurden auch *in vivo* Effekte am Zentralnervensystem beobachtet, die offenbar in der Hemmung der Monoaminoxydase ihre Ursache haben[2]. Dass auch rein periphere Wirkungen mit einem dem Harmalin nahe verwandten Stoff auftreten können, zeigten Versuche von SCRIABINE und HUTCHEON: Harmanmethosulfat führt,

[1] K. FRETER, H. WEISSBACH, B. REDFIELD, S. UDENFRIEND und B. WITKOP, J. Amer. chem. Soc. *80*, 983 (1958).

[2] S. UDENFRIEND und H. WEISSBACH, Proc. Soc. exp. Biol. Med. N. Y. *97*, 748 (1958). – A. PLETSCHER und H. BESENDORF, Exper. *51*, 25 (1959).