phases à des corpora allata possédant des pouvoirs identiques[9].

Le plus haut niveau du rythme cardiaque des solitaires au stade I est vraisemblablement déterminé par l'organisme maternel qui possèderait un plus haut niveau de rythme cardiaque au moment de l'ovogenèse. Ceci est en accord avec les premières observations faites sur le rythme cardiaque des adultes[1].

Summary. Except for a higher value of the cardiac rhythm at the beginning of the first stage of *Locusta migratoria* solitary phase, phase difference of the cardiac rhythm sets up during the 4th stage very progressively and is clearly expressed in the 5th stage, the solitarian locusts showing a higher rhythm.

J.-P. Roussel

Equipe de recherche associée au C.N.R.S. No. 118,
Biologie humorale des Insectes.
Laboratoire de Biologie Générale, Université Louis Pasteur,
12, rue de l'Université, F–67000 Strasbourg (France),
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Developmental Changes in Contraction Time and Muscle Fibre Pattern of Fast and Slow Muscles

The developmental changes in contraction time (CT) differ in fast and slow muscles within the same animal and in different species of animals[1–5]. Differentiation into fast and slow muscle types in the rat appears to be brought about by a relative shortening of CT in the fast muscle (extensor digitorum longus), there being little or no change in the slow soleus muscle in this respect[2,6]. However, histochemical findings in the soleus muscle of the guinea-pig and cat revealed a mixed fibre pattern with predominance of fibres with a high ATPase activity (Type II) at birth, and of fibres with a low activity (Type I) of this enzyme in muscles of adult animals[5].

Contraction speed and histochemical fibre pattern in fast and slow muscles of different animals (rat, rabbit, and guinea-pig) was therefore studied in order to ascertain whether prolongation of CT and change in muscle fibre pattern in slow muscles are general phenomena.

Material and methods. Fast extensor digitorum longus (EDL) and slow soleus (SOL) muscles of rats, rabbits, and guinea-pigs perinatally, 1 month after birth and of 3-, 5-, and 12-month-old animals were used in our experiments. Contraction time (time to peak = CT) was measured in vitro at 36 °C with the massive stimulation method[7] and recorded by an automatic analyzer[8]. The stimuli were square pulses of 1.0 msec in duration of supramaximal intensity. Resting tension, tension producing maximal twitch tension as a response to the stimulation, was determined before each experiment. For histochemical analysis, the muscles were removed, quickly frozen in liquid nitrogen and 10 µm thick cross-sections were gained in a cryostat at a temperature of −20 °C and stained for myosin ATPase activity by a modified method[9,10] at pH 9.4.

Contraction time (in msec) of the fast (EDL) and slow (SOL) muscles of the rat, rabbit and guinea-pig during development (at 36 °C)

Animal	Age (days)	EDL	N	SOL	N
Rat	7[a]	25.0 ± 1.02	12	47.1 ± 2.14	7
	30	11.6 ± 0.15	18	22.2 ± 0.52	7
	90	12.9 ± 0.39	7	35.0 ± 1.24	6
	365	15.1 ± 0.22	8	38.6 ± 1.07	8
Rabbit	1	49.2 ± 1.72	5	49.5 ± 3.01	5
	30	22.1 ± 1.12	5	47.3 ± 5.04	5
	90	25.8 ± 1.13	5	97.2 ± 7.62	5
	365	24.3 ± 0.71	13	82.7 ± 2.10	10
Guinea-pig	1	14.9 ± 0.69	7	29.3 ± 0.66	7
	150	15.6 ± 0.23	6	46.1 ± 1.46	5

EDL, extensor digitorum longus; SOL, soleus muscle; *N*, number of measurements. [a] for data at birth see Close[2].

Results and discussion. The Table shows CT of fast EDL and slow SOL phasic muscles of the rat, rabbit, and guinea-pig at, or very early after, birth, 1 month after birth and in the adult animal (3, 5, and 12 months after birth). The CT of the fast muscles of the rat and rabbit shows a progressive postnatal shortening, whereas the CT of EDL muscle of the guinea-pig remains rather constant. The slow SOL muscle of the rabbit and guinea-pig, however, shows postnatally a considerably shorter CT and prolongation of CT in the adult animal. In the soleus muscle of the rat, the prolongation of CT in the adult occurs after a marked temporary shortening of CT 1 month after birth. Thus the slowing of CT in the slow muscle is of general occurrence but follows a different time course in the rat, rabbit, and guinea-pig, according to their maturation at birth.

The Figure (a, b) shows the muscle fibre pattern in the SOL muscle of the rabbit in 1-month-old and adult animals. Cross-sections of the muscles were stained for myosin ATPase activity. In the SOL of the adult animal, only a few muscle fibres with a high ATPase activity (Type II) and most muscle fibres with a low ATPase activity (Type I) are found, whereas in the 1-month-old animal both types of muscle fibres are observed, the ratio being about 1:1. A similar change in muscle fibre pattern was also observed in the slow muscles of rats and guinea-pigs. Contrary to this, there is an increase of myosin ATPase activity in the fast muscles of the animals studied by us.

Thus, during development, slow muscles show a prolongation of CT and a change of fibre pattern related to a change to the slow muscle type. The different time course in prolongation of CT and temporary shortening of CT in the animals studied by us can be explained by the

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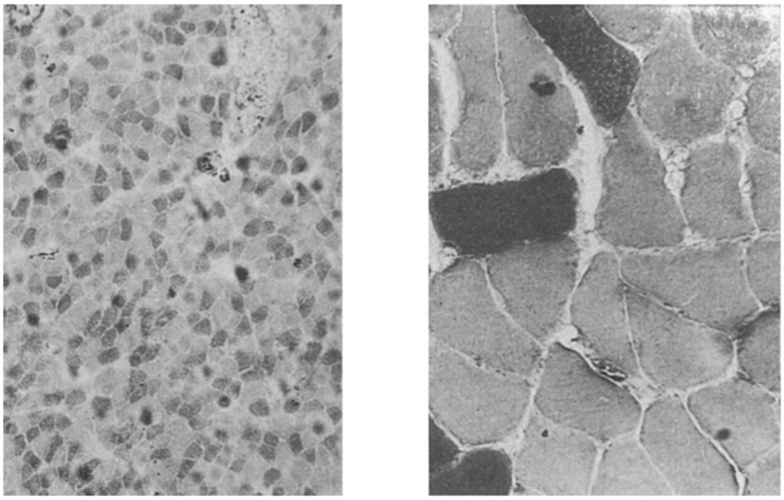

Cross-section through the soleus muscle of the 1-month-old (a) andadult (b) rabbit stained for myosin ATPase activity (× 155).

different degree or maturation of the motor system at birth. The rat has a very immature motor system at birth, similar to the rabbit, while the guinea-pig has a more mature one at birth. The temporary shortening, observed postnatally in the rat, may therefore occur prenatally in the guinea-pig. It has been suggested that the postnatal maturation process in muscle fibre pattern is of neurogenic origin[5,11]. The postnatal prolongation of CT and the change to a muscle of predominantly low myosin ATPase activity appears to be a developmental adaptation of the slow muscle to its antigravity function, the time course of this change being modified by different rate of growth of muscle, body size, and of maturation of the neuromuscular system.

Zusammenfassung. Postnatale Verlängerung nach temporärer Verkürzung der Kontraktionszeit und Zunahme von Muskelfasern mit niedriger ATPase-Aktivität im langsamen Soleus-Muskel wurde bei verschiedenen Säugetieren gefunden. Der schnelle extensor digitorum longus zeigt dagegen durchwegs postnatale Verkürzung der Kontraktionszeit.

E. Gutmann, J. Melichna and I. Syrový

Institute of Physiology, Czechoslovak Academy of Sciences, Praha 4–Krc (Czechoslovakia), 4 September 1972.

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Magnus Reflexes of the Chest Musculature in Man

Magnus[1] demonstrated that the position of the head modifies the tonus of the limb musculature of the decerebrate animal. The same phenomenon was observed in man also, in association with a variety of pathological states affecting the central nervous system. Since the tonic neck reflexes were not apparent in the normal human subject, their presence was thought to be pathognomic of central nervous system.

But in 1944 Wells[2] demonstrated that all of the tonic neck and labirintine reflexes could be elicited in normal adults if extensor muscles were first hypertonic. This observation was confirmed by Ikai[3], Tokizane et al.[4].

Massion et al.[5] demonstrated that the position of the head modifies not only the limb musculature of the decerebrated animal but the chest respiratory muscles too. Therefore it is of interest to investigate whether the neck reflexes could modify the respiratory muscles (as well as in the extensor limb muscle) in normal humans too.

The subjects of the investigation were 7 adults – 3 male and 4 female. The investigation was made with electromyograph DISA. The skin over the muscles to be studied was thoroughly cleansed with acetone. Cup-shaped silver electrodes approximately 1 cm in diameter were filled with electrode jelly and placed on the skin about an inch apart. A small piece of elasticized adhesive tape held the unit in place. Electrode pairs were placed over the intercostal spaces as follows: parasternally in the 2nd and midaxillary in the 10th.

There is usually no recordable electrical activity from the intercostals during eupnea (normal breathing) in adult subjects. In some subjects a weak inspiratory activity was recorded. The position of the head does not modify the phasic inspiratory activity. When the subject leaned forward from the standing position and put his hands on the floor, a tonic activity was recorded in the respiratory muscles. In this case the position of the head modifies the tonus of the respiratory chest muscles. Rotation of the head to the side results in an increase of the tonus of the respiratory muscles of that side. Bachward tilting of the head increases the tonus of the respiratory muscles in both – right and left sides. Forward tilting of the head produces opposite results (Figures 1 and 2).

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