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Comparative Anatomical Studies of *Nervus Musculocutaneus* in Mammals

[With 1 Fig.]

Morphology of *nervus musculocutaneus* and its ramifications in representatives of ten orders of mammals was studied. The investigations showed that there are fairly considerable differences in the morphology and topography of *nervus musculocutaneus* in different species, in respect of the trunk itself of this nerve and of its ramifications. In different species this trunk possesses a different degree of anastomosis with *nervus medianus:* from complete separation, through the intermediate stages, to complete junction in one common nerve trunk. *Nervus cutaneus antebrachii medialis,* which forms a sort of terminal extension of *nervus musculocutaneus,* innervates areas varying in extent in different species, from innervation of the upper part only of the medial side of the skin of the forearm to its passage into *nervi digitales dorsales I, II, III* and also (exceptionally) into *nervi digitales palmares communes I, II, III.*

I. INTRODUCTION

The structure of *n. musculocutaneus* and its ramifications, in particular that of *ramus muscularis distalis,* and of *n. cutaneus antebrachii med.* differs in different species of mammals and not infrequently forms a debatable point. Some authors maintain that these two branches are present in certain species, while others consider that they belong to *n. medianus.* The majority of the problems open to discussion refer to ramifications of this nerve in representatives of *Artiodactyla* and *Perissodactyla* and in *Leporidae.*

Less contradictory opinions were expressed on *n. musculocutaneus* in other mammals, *e.g.* man or the *Primates.* Marciniak (1965) states that in man this nerve runs from *fasciculus lateralis,* perforates *musculi coracobrachiales,* and continues between *m. biceps brachii* and *m. brachialis,* sending out branches to them. In the third distal part of the arm this nerve is connected with *n. medianus,* then passes on to the forearm and into *n. cutaneus antebrachii lat.,* which anastomoses with *ramus*

superficialis n. radialis. Buch-Hansen (1955), in addition to the nerve typical of man, distinguishes the so-called short musculocutaneous nerve which innervates flexor muscles only. The cutaneous branch comes from *n. medianus.* This sometimes innervates only *m. coracobrachialis,* and the other flexors are innervated by *n. medianus.* In exceptional cases, when there is not even a branch to *m. coracobrachialis,* reference is made to the absence of *n. musculocutaneus.* In the author's opinion, however, this is only an apparent absence, since in reality the fibres of this nerve are combined in the median nerve.

In the gorilla, *nn. medianus et musculocutaneus* interchange nerve fibers with each other (Preuschoft, 1964). *N. cutaneous antebrachii lat.* may extend, by means of anastomosis with *n. radialis,* to the first or even the second digit.

N. musculocutaneus in the galago (Vlatkovič, 1967) does not pierce *m. coracobrachialis,* but runs to the rear of it and sends out branches to *m. biceps brachii* and *m. brachialis. M. coracobrachialis* is innervated by the branch running directly from *fasciculus lateralis.*

In the rabbit Krause (1884), Terentev & Dubinin (1952) and Gerhardt (1909) distinguish a weakly formed *n. perforans brachii.* This nerve perforates *m. coracobrachialis,* innervates it and also *m. biceps brachii.* These authors consider that there is no *ramus muscularis distalis* or *n. cutaneus* in the rabbit.

In carnivores *n. musculocutaneus* has been described by Bowne (1959), Ellenberger (1943), Miller (1964), Arłamowska-Palider & Zabłocki (1968b), Taylor & Weber (1951). Their descriptions are similar to those given above in relation to man.

Representatives of the *Canidae* are distinguished in this group of animals by the absence of an axillary loop, while in the lower part of the arm a branch runs from *n. musculocutaneus* and joins *n. medianus,* forming in this way the ulnar loop. This branch, in Reimers' opinion (1925b), forms the lateral part of *n. medianus,* contained up to this place in *n. musculocutaneus.*

In hoofed animals, the cutaneous branch forms a ramification of *n. medianus,* and *ramus muscularis distalis* a ramification of *n. musculocutaneus* (Poplewski, 1948). Martin (1938), van der Horst (1934), Bradley (1946) and May (1964) also consider *n. cutaneus antebrachii medialis* as a ramification of *n. medianus.* Ghoshal & Getty (1967), on the other hand, state that *ramus muscularis distalis* of *n. musculocutaneus* separates from *n. medianus.* According to Schreiber (1956) and Reimers (1925a) *ramus musculocutaneus n. mediani* should be regarded as part of *n. musculocutaneus,* and Greager (1957) is also of this opinion. Franzke (1960) states that in the roe-deer *n. muscularis*

proximalis runs from the common trunk of *n. mediani* and *musculocutaneus*. Then in the further part of the arm the distal parts of *n. musculocutaneus* leave *n. medianus* and pass to the forearm as *n. cutaneus antebrachii medialis*. Reimers' studies (1925b) indicate that both *n. musculocutaneus* and *n. medianus* are formed from the lateral and medial root. From the lateral root *n. musculocutaneus*, which joins in one whole with a similar root of *n. medianus*, the branch separates to *m. coracobrachialis* and *m. biceps brachii*. It is this branch which its treated by many authors as *n. musculocutaneus*. The other parts of these roots of the two nerves combine in a strong trunk which appears to form one whole. This trunk is identified by some authors as *n. medianus*. It is due to this in Reimers' opinion (*l.c.*), that differences arise as to the appurtenance of the cutaneous or muscular branch to either one or the other of these nerves.

In ungulates, however, this nerve does not always run in the way described above. As stated by Magilton (1967), this nerve may only run in company with *n. medianus*, may exchange nerve fibres with it, or else be completely separated from *n. medianus*. In the authors' opinion it is only in the last of these cases that it is possible to state that the *ramus muscularis distalis* and *ramus cutaneus* come from the same *musculocutaneus* nerve.

The opinions of different authors in regard to *n. musculocutaneus* are divided and even contradictory. It thus appeared useful to carry out comparative anatomical studies on the chief ramifications of this nerve. This work forms a continuation of the investigations carried out on the medullar nerves of mammals.

II. MATERIAL

Examination was made of the following material: 5 *Macropus rufus*, 1 *Metachirus nudicaudatus*, 1 *Petaurus australis* — (*Marsupialia*), 6 *Erinaceus europaeus* — (*Insectivora*), 3 *Tupaia glis*, 2 *Lemur catta*, 5 *Galago senegalensis*, 1 *Lori tardigradus*, 1 *Arctocebus calabarensis*, 1 *Saimiri sciureus*, 2 *Cebus apella*, 6 *Papio cynocephalus*, 6 *Macaca mulata*, 3 *Cercopithecus cephus*, 3 *Cercocebus torquatus*, 2 *Pongo pygmaeus* — (*Primates*), 8 *Cavia porcella*, 6 *Myocastor coypus*, 2 *Hystrix cristata*, 5 *Hydrochoerus hydrochaeris*, 3 *Sciurus vulgaris*, 1 *Ondatra zibethicus*, 2 *Chinchilla laniger*, 10 *Rattus norvegicus*, 10 *Mesocricetus auratus*, 10 *Mus musculus*, 2 *Castor fiber* — (*Rodentia*), 12 *Oryctolagus cuniculus* — (*Lagomorpha*), *Bradypus tridactylus*, 1 *Zaedyus pychyi* — (*Edentata*), 15 *Canis familiaris*, 8 *Alopex lagopus*, 1 *Canis lupus*, 1 *Canis adustus*, 6 *Ursus arctos*, 2 *Nasua nasua*, 7 *Martes foina* and *Martes martes*, 10 *Mustela lutreola*, 12 *Mustela putorius furo*, 6 *Mustela putorius*, 7 *Mustela nivalis*, 1 *Mephitis mephitis*, 1 *Meles meles*, 20 *Felis catus*, 1 *Felis pardalis*, 1 *Felis concolor*, 2 *Panthera leo* — (*Carnivora*), 2 *Procavia habessinica* — (*Hyracoidea*), 8 *Bos taurus*, 8 *Ovis aries*, 5 *Capra hircus*, 4 *Lama glama*, 2 *Capreolus capreolus*, 1 *Moschus moschiferus*, 1 *Muntiacus muntiak*, 6 *Sus domestica*, 2 *Hippopotamus*

amphibius — (*Artiodactyla*), 6 *Equus caballus*, 2 *Tapirus indicus* — (*Perissodactyla*). The material was obtained from collections of the Zoological Museum of Wrocław University, the Wrocław Zoological Gardens and breeding farms.

III. RESULTS

In the marsupials I examined *n. musculocutaneus* starts from *fasciculus lateralis* of the brachial plexus. It runs slightly forwards and in the armpit sends out a branch termed *ramus muscularis proximalis*, directed chiefly to *m. biceps brachii*, and also *musculi* or *musculus coracobrachialis*. When two *m. coracobrachiales* are present (*Petaurus australis*) *n. musculocutaneus* runs between them and as a result of the very strong development of both heads of *m. biceps brachii* is completely covered by them. The trunk of this nerve next divides into two terminal ramifications, one of which forms *ramus muscularis distalis*, innervating *m. brachialis* and the continuation of *m. biceps brachii*. The second — which forms a sort of elongation of the trunk of *n. musculocutaneus* passes under the belly of *m. biceps brachii* and appears as *n. antebrachii medialis* [1]) on the lateral side of the shoulder in the gap between this muscle and the lateral head of *m. triceps brachii*. Here it lies parallel to *n. cutaneus antebrachii cranialis* (from *n. axillaris*). It next descends to the forearm and runs along the medial margin of the belly of *m. brachioradialis*. At the level of the third proximal part of the forearm it sends out a small anastomosis to *n. cutaneus antebrachii cranialis* and itself continues towards the digits. Near *articulatio carpometacarpalis*, *n. cutaneus antebrachii medialis* is situated near *ramus nervi mediani* (temporarily termed *n. mediano-radialis*), to which it sends part of its fibres. The area of skin innervation ends at the level of the carpus, except for those fibres which through the *n. medianus* reach to *nn. digitales dorsales*.

N. musculocutaneus in the hedgehog is a formation also completely separate from *n. medianus*. After separation from *fasciculus lateralis* it sends a muscular branch to *m. coracobrachialis* and the long head of *m. biceps brachii*. Further on it runs along the belly of this muscle and in the lower part of the arm sends out *ramus muscularis distalis* and *n. cutaneus antebrachii medialis*, which runs to the hand, forming *n. digitalis medialis I* and *n. digitalis dorsalis I*.

The same type of *n. musculocutaneus* usually occurs in representatives of *Tarsioidea* and *Lemuroidea* and platyrhine monkeys as in the hedgehog or in marsupials. In one of the representatives of *Cercopithecus* examined the course taken by this nerve is also similar to that in the previously mentioned animals. The existing differences are mainly in respect of the

[1]) *N. cutaneus antebrachii lateralis* in man and the *Primates*.

distal parts of *n. cutaneus antebrachii lateralis*, which in the above monkeys, contrary to the hedgehog or marsupials, anastomoses with *ramus superficialis n. radialis*, then passes in the direction of the lateral side of digit *I*.

In catarhine monkeys the initial part of this nerve is typical of *Primates*. It is not until below the terminal insertion of *m. coracobrachialis longus* (half way along the arm or slightly below it) that the trunk of *n. musculocutaneus* runs to the rear, consequently approaching *n. medianus*, from which it had been separated until then by *m. coracobrachialis longus*. Here also the fairly weakly formed trunk of *n. musculocutaneus* divides into two parts. One penetrates into the lower part of *m. biceps brachii*, while the other is joined by a strong branch of *n. medianus*. The latter, exceptionally well formed in baboons, is thicker than that part of *n. musculocutaneus* which it joins. The strong nerve formed by this junction runs in the direction of the arm, sends out branches to *m. brachialis* and passes on to the forearm as *n. cutaneus antebrachii lateralis*. This nerve divides into two parts immediately after its emergence from under the tendon of *m. biceps brachii*. The branch lying near the centre, parallel to *arteria radialis*, passes in the carpal region to the palmar side, enters under the fascia and innervates the metacarpal bulb. The second, running along the margin of *m. brachioradialis*, joints *ramus superficialis n. radialis* at the third distal part of the forearm and its terminal ramifications innervate the skin of the carpal area. This behaved differently in one of the representatives of this species I examined. The initial part of *n. musculocutaneus* formed from two branches coming from *fasciculus lateralis* and *fasciculus medialis*. The trunk of this nerve, formed in this way, sends forward *ramus muscularis proximalis*, and itself runs along the medial line of the arm from the back of *m. coracobrachialis*. Below the lower margin of *m. latissimus dorsi* this nerve bifurcates, one part penetrating into the trunk of *n. medianus*, the second passed to *ramus muscularis* and *n. cutaneus antebrachii lateralis*.

In the mangaba *n. musculocutaneus* is typical. There is no division up to the terminal part of *n. cutaneus antebrachii lateralis*, when without joining *n. radialis* it reaches digit *I*, innervating it from the ulnar and radial side.

Fairly numerous individual differences occur in rhesus monkeys. *N. cutaneus antebrachii lateralis* may take the form of a single trunk sending out numerous branches all along its length to the skin of the forearm, or may be divided into two branches as in the baboon. In one of the rhesus monkeys the so-called *n. musculocutaneus brevis* was present. It began from *fasciculus lateralis* of the brachial plexus and sent out branches to the following muscles: *coracobrachialis*, *brachialis* and the

proximal part of *m. biceps brachii*. The distal part of this last muscle and the skin of the forearm were innervated by a strong branch of *n. medianus*.

In the orangoutang *n. musculocutaneus* presents the same type as that observed in platyrhine monkeys. The differences observed respect the high location of departure (in the upper part of the arm) of the branch to *m. brachialis* and immediately after the division of the trunk of this nerve into two branches running parallel to each other. One of them innervates the distal part of *m. biceps brachii*, and the second bifurcates and extends to the forearm as two branches of *n. cutaneus antebrachii lateralis*.

Among carnivores the typical completely separate trunk of *n. musculocutaneus* occurs in *Felidae*, *Procyonidae* and *Mustelidae*, although certain variations may occur in representatives of the last family. After separating from *fasciculus lateralis* this nerve sends out *ramus muscularis proximalis*, which innervates either *m. biceps brachii* only (majority of the *Mustelidae* representatives examined) or else *m. coracobrachialis brevis* as well (*Felidae*, *Procyonidae*) or additionally *m. coracobrachialis longus* (marten, badger, cat — 30%). The trunk of *n. musculocutaneus* next behaves similarly to the way it does in the hedgehog, *Petaurus* or tupaja. The terminal part of *n. cutaneus antebrachii medialis* extends to the medial side of digit *I* in *Mustelidae*. In the cat and raccoon families this nerve joins the medial part of the cutaneous branch of the radial nerve in the carpal region and passes with it into *n. digitalis medialis I* and *n. digitalis dorsalis I*.

In one of the representatives of *Nasua* which I examined the trunk of *n. musculocutaneus* did not run along the belly of *m. biceps brachii*, but lay close to *n. medianus* and was connected with it by connective tissue. After emerging from the supracondylar foramen this latter nerve sent out anastomosis to *n. cutaneus antebrachii medialis*.

In three ferrets and a skunk *n. musculocutaneus* differed completely, namely after sending out a branch to *m. biceps brachii* the trunk of this nerve joined *n. medialis* and run with it to the distal part of the arm, where it separated from it and for the rest of its course run similarly as found in *Mustelidae*.

The diagram of the structure of this nerve in the bear is in principle the same as in the majority of *Carnivora*. Only certain individual variations, mainly in relation to the junctions with *n. medialis*, are observed in these animals. After sending out *ramus muscularis proximalis* the distal part of *n. musculocutaneus* enters into the anastomosis with the branch of *n. medianus*. The fibres from this branch may pass either to the branch running to *m. brachialis* or to *n. cutaneus antebrachii me-*

dialis, or only to the latter, and then pass with it in the direction of the medial side of digit *I*.

The behaviour of this nerve differs from the above in the *Canidae* family. It arises as the direct extension of *fasciculus lateralis*, and does not therefore form the axillary loop found in all the other species described above. Near the shoulder joint it sends out *ramus muscularis proximalis*, then in the distal part of the arm sends out an anastomosis to *n. medianus*, thus forming the ulnar loop. By means of this anastomosis nerve fibres, which in other species penetrate into this nerve through the axillary loop, extend to *n. medianus*. *N. musculocutaneus* is particularly interesting in one of the dogs examined. This nerve left the brachial plexus in the typical way and sent out *ramus muscularis proximalis*, then without forming an ulnar loop extended into *n. cutaneus antebrachii medialis*, which entered under *m. pronator teres*. On the forearm this nerve joined the median artery, and further on run like the distal part of *n. medianus*, *i.e.* passed to *nn. digitales palmares communes I, II, III*.

In many representatives of *Rodentia* *n. musculocutaneus* represents the type described previously. *Rami musculares proximalis et distalis* are observed, and the trunk of this nerve entering into *n. cutaneus antebrachii medialis*, as is the case with the squirrel, chinchilla, hamster, rat, mouse and nutria.

In the beaver differences occur in respect of the connections of this latter nerve with the branchings of *n. medianus* and *radialis*, which join it as early as within the fascicles of *m. brachialis*.

Particularly strong connection between *n. cutaneus antebrachii medialis et n. radialis* occur in the muskrat. The first branch of this nerve reaches it as it does in the beaver, the second — slightly below — halfway along the forearm. *N. cutaneus antebrachii medialis* (exceptionally strongly formed) innervates the skin of the forearm with numerous ramifications and passes into *n. digitalis dorsalis I* and *n. digitalis medialis I*.

This nerve is slightly different in the porcupine, namely after entering under *m. coracobrachialis longus* and sending out a branch to that muscle and also to *m. biceps brachii*, the trunk of this nerve, very weakly formed, runs down the arm, where it receives a strong fascicle of nerve fibres which separates from *n. medianus* at the level of the shoulder joint. It runs above *m. coracobrachialis longus* and joins *n. musculocutaneus*. From the trunk formed in this way a branch runs to *m. brachialis* and *n. cutaneus antebrachii medialis* and extends to the medial side of digit *I*.

N. musculocutaneus in the capybara and guinea pig is completely different from that in the above mentioned rodents, since in these animals

there is no independent trunk of this nerve. The combined trunk of two nerves is observed *i. e. n. medianus* and *n. musculocutaneus*, from which a branch runs to *m. coracobrachialis longus*. Far lower down, halfway along the arm, the next ramification separates from the trunk and innervates *m. biceps brachii*. In the lower part of the arm this trunk divides into two parts, one of which forms *n. medianus* and the other passes into a branch to *m. brachialis* and *n. cutaneus antebrachii medialis*. This nerve is exceptionally strongly developed in the capybara, and its terminal extension reaches the dorsal side, forming *n. digitalis medialis II* and *n. digitalis dorsalis II*. In other individuals in which only three digits had formed (digit *II* absent) this nerve passed into *nervus digitalis medialis III*.

In the rabbit *n. musculocutaneus* represents the same type as in the two rodents described above, except that *n. cutaneus antebrachii medialis* is very weakly developed and extends to the region of the upper part of the forearm.

In representatives of *Hyracoidea* also this nerve is running similarly, and *n. cutaneus antebrachii medialis* extends into *n. digitalis medialis II*.

In the sloth also there is no separate trunk of *n. musculocutaneus*. A branch runs from the common trunk to *m. coracobrachialis*, and half way along the arm a strong ramification separates and divides into three branches. One of these innervates *m. brachialis*, the second — *m. biceps brachii* and entering under *m. brachioradialis*, joins *n. radialis*, like the third branch, which at a short distance from the ulnar joint enters into anastomosis with the above nerve.

This nerve behaves very differently in another representative of *Edentata* — the armadillo. It is similar to that in insectivores, lemuroids or certain rodents. *Ramus muscularis proximalis* is present, running to *m. coracobrachialis* and the short head of *m. biceps*; *ramus muscularis distalis* — to the long head of the latter and to *m. brachialis*, and also the weakly developed *n. cutaneus antebrachii medialis*, which in the upper part of the forearm obtains a small anastomosis with *n. medianus*.

In principle *n. musculocutaneus* behaves similarly (except for the armadillo) in the representatives of *Perissodactyla* and *Artiodactyla* examined. *Ramus muscularis proximalis* may run either directly from *fasciculus lateralis*, or from part of the ramifications of *fasciculus lateralis* and *medialis* of the brachial plexus, which are combined in one trunk. In this latter case this branch may contain fibres coming from both fasciculi, like the next ramification, which always separates from this common trunk at different levels. The place at which this ramification separates from the trunk does not constitute a characteristic of any particular

species but is more an individual variation. Some of the fibres of this ramification form *ramus muscularis distalis* innervating *m. brachialis*, or *m. biceps brachii*. The latter may be innervated either only by a very strongly formed *ramus muscularis proximalis*, or else by *ramus muscularis distalis*, then innervating the distal part of this muscle. The remainder of the nerve fibres of this ramification referred to, passing on to the forearm, extend into *n. cutaneus antebrachii medialis* differently formed in different species. In one of the llamas examined *n. musculocutaneus* differed from the above description. After sending out *ramus muscularis proximalis* the remaining part of the fibres of *fasciculus lateralis* did not join *n. medianus*, but formed an independent trunk of *n. musculocutaneus* although situated in the immediate neighbourhood of *n. medianus*. The distal part of this nerve runs as previously described.

In the tapir also this nerve only runs in company of *n. medianus* and is connected with it by connective tissue. The greater the distance from the brachial plexus the greater the distance between these two nerves becomes, despite the fact that they continue to be connected by connective tissue. It is not until the lower part of the arm that complete separation of *n. musculocutaneus* takes place, when this nerve bifurcates. One of the branches innervates *m. brachialis*, the other passes on to the forearm, where its numerous ramifications innervate the skin on the medio-dorsal side of the forearm and metacarpus. The longest of them, running parallel to *ramus cutaneus n. radialis*, passes into *n. digatalis medialis II.*

N. cutaneus antebrachii medialis, most weakly formed and possessing the smallest area of innervation, occurs in the goat, sheep, llama and pig. It innervates the skin of the medio-dorsal side of the upper third of the forearm.

It is only in the longlegged sheep examined that this area is greater and reaches the carpal region.

The case is similar in red and roe deer, except that in these animals part of the nerve connects with ramifications of the radial nerve, with which it may extend to the ulnar and radial side of digit *III*.

In the cow the situation is the same except that *n. cutaneus antebrachii medialis* may not connect with *n. radialis* and then its terminal part is extended into *n. digitalis medialis III*.

N. cutaneus antebrachii medialis in the horse, in addition to innervating the skin of the medial side of the forearm and carpus, passes on to the dorsal side and innervates the fetlock area.

This nerve is most strongly developed in the hippopotamus. After emerging from under *m. biceps brachii* it divides into a number of

branches. Some of them, situated on the medial side, innervate the skin to the level of the carpus. Others turn on to the dorsal surface of the forearm, where they join branches of *n. radialis*. The very strong terminal extension of this nerve passes into *n. digitalis medialis II, n. digitalis dorsalis II, n. digitalis lateralis III.*

III. DISCUSSION

The facts presented above provides a basis for distinguishing several main types of *n. musculocutaneus,* within which certain variations may occur.

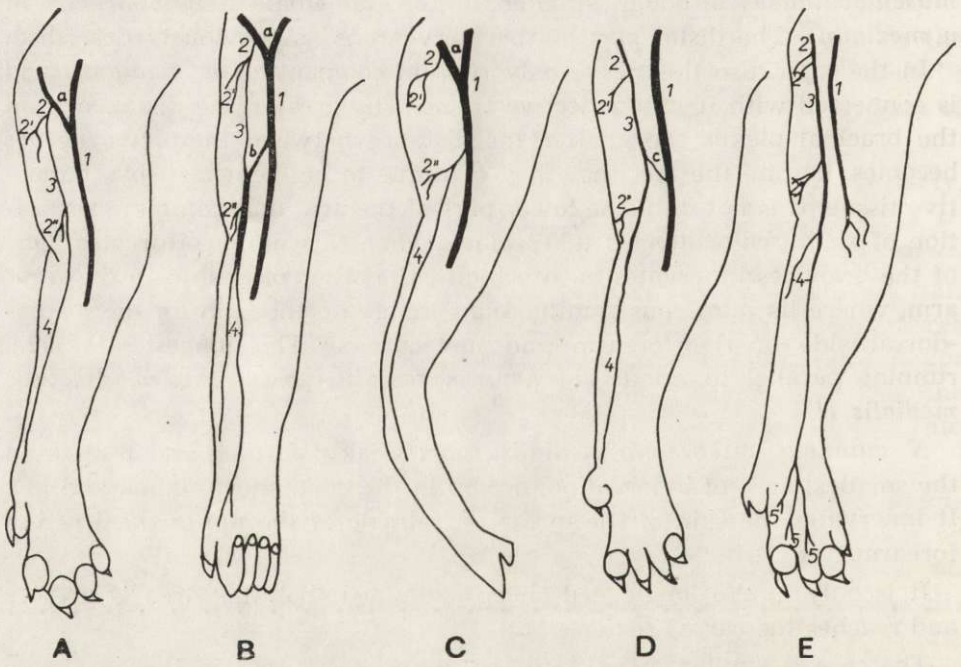

Fig. 1. Diagrams of different types of *nervus musculocutaneus.*
A — type I, B — type II, C — type IV, D — type III, E — type III (variant).
1 — *n. medianus,* 1′ — branch to *flexores antebrachii,* 2 — *n. musculocutaneus,* 2′ — *ramus muscularis proximalis* of this nerve, 2″ — *ramus muscularis distalis,* 3 — trunk of *n. musculocutaneus,* 4 — *n. cutaneus antebrachii medialis,* 5 — *nn. digitales palmares communes I, II, III,* a — axillary loop, b — anastomosis of *n. medianus,* c — ulnar loop.

The first type (A, Fig. 1) occurs in *Marsupialia, Insectivora,* the majority of the *Primates* and *Carnivora,* many rodents and the armadillo. It is characterized by *n. musculocutaneus* separating from *fasciculus lateralis* of the brachial plexus, and the trunk of this nerve being an independent formation completely separated from *n. medianus.*

The second type (B, Fig. 1) is characteristic of catarhine monkeys. As in the first type the axillary loop is present and there is a separate, although weakly formed, trunk of *n. musculocutaneus*. In the distal half of the arm, however, a strong ramification (often even stronger than the trunk itself) of *n. medianus* extends to this weak trunk. This anastomosis forms a loop which constitutes the reverse of the loop occurring in the next type.

The third type (D, Fig. 1) is characteristic of representatives of the *Canidae* family. There is no axillary loop in this type, and *fasciculus lateralis* extends into the trunk of *n. musculocutaneus*. In the lower half of the arm this nerve sends out an anastomosis to *n. medianus*, that is, the reverse of what is found in catarhine monkeys. This anastomosis forms the ulnar loop with *n. medianus*. A characteristic feature of this type is that *n. musculocutaneus* contains not only »its own« fibres intended for *m. flexores* and *m. cutaneus antebrachii*, but also carries part of the fibres of *n. medianus*.

This can be seen very distinctly in the case described previously of the different behaviour of *n. musculocutaneus* in the dog (E, Fig. 1). The genesis of this case would appear to be clear. As the ulnar loop was not formed there, the fibres normally forming the distal part of *n. medianus* did not combine with the trunk of this nerve but formed a specific extension of *n. musculocutaneus*.

The fourth type (C, Fig. 1) occurs in representatives of *Artiodactyla* and *Perissodactyla*, *Leporidae*, some rodents and the sloth, and exceptionally in carnivores (ferret, skunk). In this type there is in fact no trunk of *n. musculocutaneus*. It is only a separate *ramus muscularis proximalis*, and all other fibres, through the axillary loop, penetrate into the trunk of *n. medianus* running within it and exchanging fibres with it.

Many of the facts described above referring to junctions between *n. musculocutaneus* and *n. medianus* give grounds for considering this last type as the original one. It might then be said that originally there was no *n. musculocutaneus*, but only *ramus muscularis proximalis* emerging from *fasciculus lateralis* of the brachial plexus. The true *n. musculocutaneus* does not appear until later, as the result of the fibres forming *ramus muscularis distalis* and *n. cutaneus antebrachii medialis* not penetrating into the trunk of *n. medianus*, but forming a separate unit — that is, *n. musculocutaneus*. An argument against this concept, however, is the fact that this type occurs primarily in ungulates, that is, in species in which the limb has undergone considerable modification, whereas in mammals with relatively primitive formation of the limb the first type of *n. musculocutaneus* is found. If it is assumed therefore that the primitive feature is the presence of *n. musculocutaneus*, as in the first

type, then secondary absorption of the fibres of the trunk of *n. musculocutaneus* by *n. medianus* should have to take place. Evidence that this concept is correct is provided by the fact that *n. musculocutaneus*, formed in this way, occurs not only in representatives of the lower systematic groups, but primarily in those mammals in which *m. biceps brachii* and *m. coracobrachialis* exhibit primitive structure (Arłamowska-Palider & Zabłocki, 1968). Reduction in the short head of *m. biceps brachii* and *m. coracobrachialis longus* is favourable to the process of absorption of *n. musculocutaneus* by *n. medianus*, since elements disappear which originally separated these two nerves from each other.

Further studies are, however, essential in order to establish which of the concepts presented is the correct one.

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BADANIA ANATOMO-PORÓWNAWCZE NERWU MIĘŚNIOWEGO SSAKÓW

Streszczenie

Celem niniejszej pracy było przeprowadzenie analizy morfologicznej nerwu mięśniowoskórnego (*nervus musculocutaneus*) i jego odgałęzień u przedstawicieli następujących rzędów: torbaczy, owadożernych, naczelnych, gryzoni, zajęczaków, szczerbaków, mięsożernych, góralków, nieparzystokopytnych i parzystokopytnych. Opierając się na przeprowadzonych badaniach można stwierdzić, że morfologia i topografia nerwu mięśniowoskórnego u poszczególnych gatunków wykazuje dość znaczne różnice. Dotyczą one zarówno samego pnia tego nerwu jak i jego odgałęzień.

Pień ten posiada, u różnych gatunków, różny stopień zespolenia z nerwem pośrodkowym (*nervus medianus*); od całkowicie wyodrębnionego, poprzez stadia pośrednie, do zupełnego połączenia się w jeden wspólny pień nerwowy. Nerw skórny przyśrodkowy przedramienia (*nervus cutaneus antebrachii medialis*), stanowiący jakby końcowe przedłużenie nerwu mięśniowoskórnego, ma u poszczególnych gatunków zmienną wielkość obszaru zaopatrzenia. Od unerwienia tylko górnej części przyśrodkowej strony skóry przedramienia, aż do przejścia w nerwy grzbietowe palców I, II, III (*nervi digitales dorsales I, II, III*), a także wyjątkowo wprawdzie w nerwy dłoniowe wspólne palców I, II, III (*nervi digitales palmares communes I, II, III*).