

- b. The short muscles of the little toe, . . .
- 1. Flexor brevis minimi digiti.
 - 2. Abductor minimi digiti.
 - 3. The occasional opponens minimi digiti.
 - 4. The occasional abductor ossis metatarsi minimi digiti.
- c. The interossei, . . .
- 1. Four dorsal.
 - 2. Three plantar.

The determination of muscle homologies.—In tracing the history of any muscle or group of muscles the characters upon which most dependence is to be placed are clearly : (1) the position, (2) the insertion, (3) the nerve supply. Not one of these, however, can be looked upon as an infallible guide. The insertion, inasmuch as it involves the action or function of a muscle more than the origin, is of considerably greater importance. The origin, and in a corresponding measure, the position of a muscle are changeable features upon which we cannot place much reliance. The best example which can be given of this is the descent of the different bellies of the extensor brevis digitorum from the fibular aspect of the leg to the dorsum of the foot. Still in the group of muscles with which we have to deal instances of the same kind are by no means infrequent. Thus the marginal intrinsic muscles of the foot (*i.e.*, the abductor minimi digiti and abductor hallucis) show an invariable tendency to extend backwards to the os calcis for their origin, and, when the hallux or minimus is absent, the dorsal interosseus which thus becomes marginal commonly exhibits a like tendency unless it be confined by a rudimentary metatarsal. The adductors perhaps more than any other members of the intrinsic group tend to shift their origin according to the requirements demanded of them. The character of these changes will be fully discussed later on.

Dr. Georg Ruge of Heidelberg insists strongly upon the invariable and immutable relationship between nerve supply and muscle homology. He asserts with Gegenbaur that a muscle is to be regarded as the end-organ of a nerve, and therefore when a muscle alters in position and connections its original and typical relations can always be identified by its nerve of supply.¹ That this is a most valuable aid in our endeavours to discover the history of a muscle no one will deny ; but that it is an infallible guide is a view which is contrary to fact. We shall afterwards have occasion to refer to this.

Recognising, then, the importance of the nerve supply as a guide in the determination of muscle homology, I have, in the present inquiry, examined the plantar nerves in connection with the muscles in as many cases as it was possible to do so.

In the human foot we find that the abductor hallucis and the flexor brevis hallucis are supplied by the internal plantar nerve, whilst all the other intrinsic muscles receive their nerve supply from the external plantar nerve. The second and first dorsal interossei sometimes receive additional nerve fibres from the anterior tibial nerve on the

¹ Processes in the Development of the Muscles of the Human Foot, *Morphologisches Jahrbuch*, 1878, p. 137.