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## THE M. GLUTAEUS QUARTUS (SO-CALLED M. SCANSORIUS) IN MACAQUES

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The M. glutaeus quartus is generally regarded to be absent in lower catarrhina. In contrast to this, however, the authors found the muscle in one case of crab-eating monkey, and described the details on it. In addition, comparison was made with the findings reported for other primates.

The muscle, which has been termed the M. glutaeus quartus or M. scansorius, is considered to be a division of the M. glutaeus minimus. Although it may be found in many primates, this muscle apparently is generally regarded to be absent in cercopithecoidea. In contrast to this, a muscle was found by SATOH during the course of the investigation of the musculature of several species of macaques which he felt should be regarded as the so-called M. scansorius. Since the details were not mentioned, a fuller description is presented in this report.

### FINDINGS

The present case was found during the investigation of formalin fixed specimens of *Macacus cyclopsis* (20 limbs), *Macacus irus* (20 limbs) and *Macacus rhesus* (10 limbs). The finding of interest was seen in only one case of *Macacus irus* (No. 276, female), and concerns the right limb.

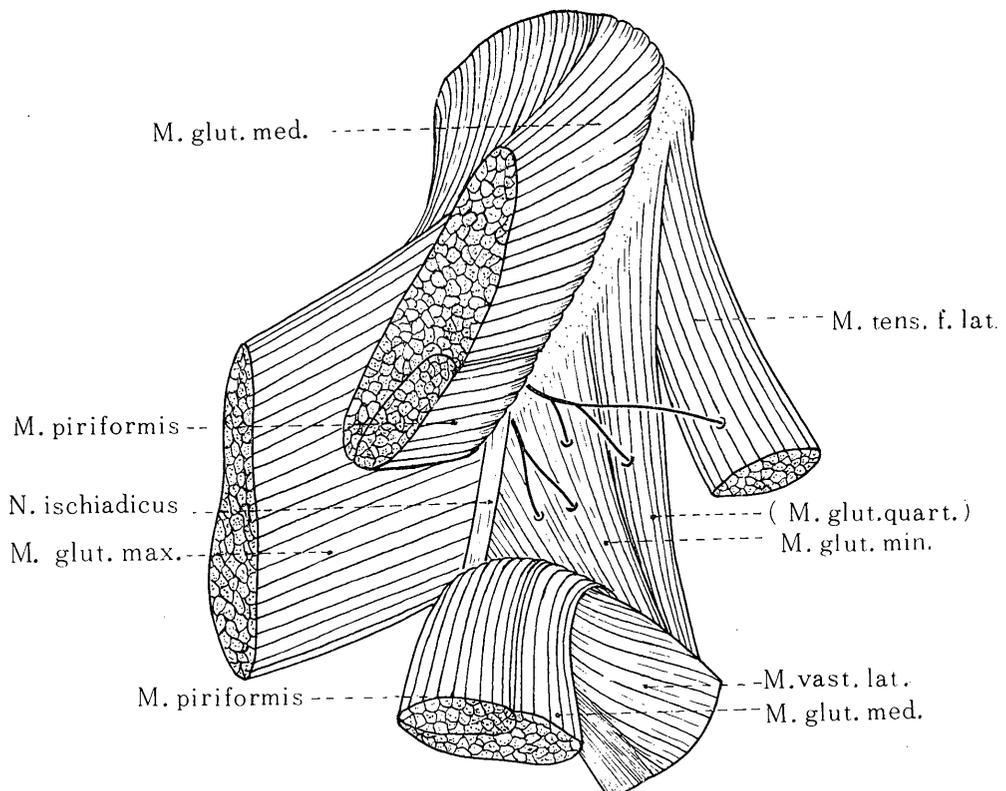
The location of the M. glutaeus minimus of this case was normal being situated in the lower (deep) layer of the M. glutaeus medius with muscular origin from the lower half of the lateral surface of the ilium and tendinous insertion into the greater trochanter. However, it differed from the usual condition in the following way.

Inspection of the M. glutaeus minimus on the left side showed that the back side (ventral surface) appeared to be a single muscle. On the

front side (dorsal surface), there was a linear tendinous band which extended from about the middle of this muscle down to the insertion and in this area there was a shallow groove which separated this muscle into two parts. This fissure did not extend to the back surface so that the *M. gluteus minimus* was not completely divided into two parts.

In contrast to this, the *M. gluteus minimus* on the right side was divided into two parts. That is, the origin of the *M. gluteus minimus* on the right side was almost completely divided into an anterior (lateral) part and a posterior (medial) portion. These two portions were separated from each other by coarse connective tissue and union of these two parts did not occur until immediately before the insertion into the greater trochanter. Furthermore, the dorsal half of the anterior portion (lateral part) and the ventral half of the posterior portion (medial part) overlap each other so that a classification into a superficial layer and deep layer is possible.

These two muscles were innervated by three branches of the *N. gluteus superior* each of which separated into two parts that enter into the anterior and posterior portions, respectively. These branches also



supply the M. tensor fasciae latae.

The M. ilioprochantericus was found in this case as reported by SATOH. This is a narrow band-like muscle which arises from the lower part of the tendon of origin of the M. rectus femoris and runs antero-downward along the hip-joint capsule. It does not extend as far as the lesser trochanter but inserts into the capsule nearby. Furthermore, it receives a small muscle bundle, which separates from the M. gluteus minimus located behind this muscle. The M. ilioprochantericus is supplied by a small branch from the N. femoralis which pierces the M. iliacus.

## DISCUSSION

The separation of the M. gluteus minimus into independent anterior and posterior portions is seen rarely in man also and this is called the M. gluteus quartus or M. scansorius (TRAILL). This variation apparently is seen quite extensively in primates.

1) Among *Prosimiae*, the M. gluteus minimus itself is not definitely present as a separate muscle in *Lorisidae* by WATERMAN. According to HILL, even in *Galegidae* and *Lorisidae* in which the M. gluteus minimus is found there is no mention of the M. gluteus quartus (M. scansorius). Therefore, the separation of the M. gluteus minimus and hence the formation of the M. gluteus quartus (M. scansorius) presumably is not found at the level of *Lorisiformes*.

In *Lemuroidea*, however, the M. gluteus minimus is definitely identified. In addition, the anterior edge of the M. gluteus medius becomes separated to form the M. gluteus quartus in *Tarsius* and *Haplorhines* (HILL). It is reported that the M. gluteus quartus may be found even in *Lemur macaco* (RANKE, JAZUTA). There are, however, some investigators who deny such findings in *Lemuroid* (MURIE and MIVART).

2) The situation is slightly different in *Platyrrhina* in which there frequently is separation of the M. gluteus medius and minimus with formation of the M. gluteus quartus. The separation of a definite relatively large muscle has been reported in *Ateles paniscus* and *Hapale jachus* by JAZUTA, in genus *Hapale* by BEATTIE, in *Hapale pinicillata* by BISCHOFF and in *Mycetes fuscus* by SIRENA. However, it is reported to be absent in *Cebus capcinatus* (JAZUTA) and indefinite in *Tamarin* (JAMISON, HILL).

According to JAZUTA, the condition of this separate excessive muscle in *Platyrrhina* is somewhat different from that in other anthropoid apes. He concluded that the true M. scansorius, i. e., the M. gluteus quartus, is not present and called this the "pseudoscansorius".

3) Furthermore, very few reports confirm the presence of the *M. gluteus quartus* in catarrhina and even when it is present there are many indefinite points. OKUDA reports that one case was found in a study of 40 limbs of *Macacus rhesus* while HOWELL and STRAUS in their "Anatomy of the Rhesus Monkey" mention that this muscle may be present but there is no detailed description in either. According to LE DOUBLE, TESTUS reports that the *M. gluteus quartus* has been noted by BISCHOFF in *Cynocephalus maimon*, *Cercopithecus sabaesus*, *Macacus cynomolgus*, etc., and that TESTUT personally also has found this muscle in lower monkey. However, KOHLBRUGGE, JAZUTA, etc., are not in accord with this view and argue that the muscle considered to be the *M. gluteus quartus*. i.e., the *scansorius*, should be regarded as the *M. ilioprochantericus*. SATOH also felt that the latter view is more appropriate.

Investigators who disagree to the view on the presence of this muscle in catarrhina include MICHAELIS, CHAMPNEY, FICK, etc., and in particular, JAZUTA who examined a comparatively large number of different types of catarrhina has not noted this muscle. SUGIYAMA who studied a large number of *Macacus cyclopsis* has not found complete division in any case although a tendency toward separation was frequently noted.

In summary, the results of past studies seem to deny the presence of the *M. gluteus quartus* (*M. scansorius*) in catarrhina, i. e., ceropithecoidea.

4) In contrast, the presence of this muscle is noted in most anthropoid apes. When compared with other anthropoid apes, this muscle is considered to be infrequent in gibbons. Some investigators report that there simply is a separation of one part of the muscle fibers of the *M. gluteus minimus* rather than a complete *M. gluteus quartus* (*M. scansorius*) (JAZUTA). Others claim that it is present (HUXLEY, HEPBURN, BISCHOFF) or feel that the muscle found should be regarded as the *M. ilioprochantericus* (KOHLBRUGGE, HEPBURN, DENIKER, etc.). A well developed muscle is said to be always present in orang-utan and is very frequently reported to be a complete *M. gluteus quartus* (*M. scansorius*) (BISCHOFF, HUXLEY, LANGER, HEPBURN, FICK, RANKE, JAZUTA, etc.). There are a considerable number of reports on chimpanzee but the findings are not necessarily consistent. Some workers have reported it to be present (HEPBURN, FICK, RANKE, MACDOWELL, CHAPMAN, HUXLEY, etc.) while others say that it is absent (HUMBRY, MACALISTER, DENIKER, etc.) but this muscle has been found in a comparatively larger portion of the reports. Even when it is present, it generally seems to be poorly developed.

In gorilla, likewise there are workers who noted this muscle (DENIKER, CHAPMAN, SOMMER, PIRA, HEPBURN, MACALISTER, RAVEN, PREUCSHOFT (c.), etc.) and those who were unable to find this muscle

(BISCHOFF, RANKE, HARTMAN, PREUSCHOFT (b)).

Thus, the development of this muscle in anthropoid apes is variable. Although it is always present in orang-utan, it is occasionally absent in chimpanzee and is found the least frequent in gorilla.

5) Therefore, the muscle termed the *M. scansorius* or the *M. glutaeus quartus* is present in anthropoid apes but absent as a rule in catarrhina.

Then, how should the case presented here be interpreted? There is no problem with regard to the left limb of our case. In the right limb, however, independent muscles were found although the muscles overlapped in one part. There was close relation between the two in that each portion arose from the ala of the ilium and the two muscles became fused before inserting into the greater trochanter.

In view of the nerve supply by branches of the N. glutaeus superior to both of these two muscles, they are of the same system. The portion located anteriorly is a separation of the anterior edge of the *M. glutaeus minimus* and as mentioned by SATOH may be regarded as the *M. glutaeus quartus*. The muscle situated posteriorly, that is on the medial side, should be considered to be the *M. glutaeus minimus*.

In particular, the finding that the so-called *M. scansorius* is covered in one part by the *M. glutaeus minimus* with fusion between the two at the insertion is exactly the same as that reported by RANKE in chimpanzee.

Therefore, in contrast to past belief, the *M. glutaeus quartus* may in rare cases be found in catarrhina.

Furthermore, the muscle fiber bundle which ran from the *M. glutaeus minimus* to the *M. ilioprochantericus* is suggestive of the *M. glutaeus quartus* which is formed by the separation of the deep layer of the *M. glutaeus minimus* of RIBBING, or suggests the condition reported by PIRA in a case of gorilla in which a portion of the *M. glutaeus minimus* separated and inserted into the lesser trochanter together with the *M. ilioprochantericus*. However, consideration of the nerve supply suggests that it simply serves to compensate and reinforce the poor development of this muscle.

## CONCLUSION

During the investigation of a total of 50 limbs of *Macacus cyclopsis*, *Macacus irus* and *Macacus rhesus*,<sup>1</sup> an independent muscle was found located at the anterior edge of the *M. glutaeus minimus* of one case of *Macacus irus*. In view of the relation to surrounding muscles and the nerve supply, this is felt to be an independent separation of one part of the *M. glutaeus minimus* and should be regarded as the so-called *M. glutaeus quartus* or *M. scansorius*. Although this muscle is generally

considered to be absent in catarrhina, i. e., cercopithecoidea, this finding suggests that it may be present in very rare cases.

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