Physiology. — "*Velocity of the intestinal movements in different mammals.*" By Dr. E. LAQUEUR and W. R. VAN DER MEER. (Communicated by Prof. HAMBURGER).

It is a well-known fact that the metabolism of the smaller kinds of mammals is more intensive than that of the larger kinds. The smaller species not only take comparatively more food, but the need of food makes itself *more frequently* felt. To explain the latter fact it must be assumed that in the smaller animals the food passes much more rapidly through stomach and intestinal canal than in the bigger ones. This is also borne out by the fact that the smaller species defecate much more frequently than the larger ones. The velocity with which the food passes through the intestinal canal is certainly dependent on the velocity of the intestinal movements.

Generally speaking the movements of the larger mammals are slow and heavy as compared with the movements of the smaller kinds. The problem relating the velocity of the intestinal movements is the more important since it seems that it is *not* absolutely certain if the quality mentioned just now, which holds good for (transversely) striated muscles is also found in lissed (non-striated) muscular cells.

Immediately on the abdominal cavity being opened, it becomes manifest that the movements of stomach and intestinal canal are indeed much more rapid in smaller mammals (e. g. rat and mouse) than for instance in the rabbit. The difference becomes still more conspicuous when an intestinal coil is extirpated and allowed to move in a suitable warm salt-solution which has been saturated with O_2 (e.g. the one suggested by TYRODE).

A further investigation of this difference is the object of these researches. For this purpose we adopted the method applied by MAGNUS when studying the qualities of the "surviving" intestine. As we know he suspended a piece of an intestinal coil in a solution of 37° through which a current of oxygen was led. The contractions of the longitudinal muscle were transferred to a lever and registered. The intestines of smaller animals present some difficulty since the absolute value of the intestinal muscular force is but small. We have examined the intestinal movements of 8 kinds of mammals (mouse rat, guinea-pig, rabbit, cat, dog, pig, cow) and that nearly always on duodenum and ileum [1]).

[1]) I avail myself of this opportunity to tender my best thanks to Prof. C. F. A. KOCH, who enabled me to examine also pieces of intestines of man, which it had been necessary to remove by operations. Until now however, only pieces of coecum and processus vermiformis could be supplied; both parts showed very slow movements.

Though the contractions of the isolated piece of intestine cannot be considered identical with the movements taking place in the body in normal circumstances, yet it must be assumed that certain properties of the living intestine may be studied by means of the isolated one.

The results obtained with the 2 kinds of animals mentioned last, are not absolutely certain, as we were not able to study for a long time at a stretch the intestinal movements of these animals, which were killed at the slaughter-house. This was only the case with those which were killed at the laboratory.

Perhaps it is more difficult to feed the thick-walled intestines of pig and cow sufficiently with O_2. Moreover the intestines of the animals killed, cannot be exposed at once to a current of oxygen, because the intestines have to be taken from the slaughter house to the laboratory. This was done as carefully as possible in a so-called Thermos-flask (DEWAR's flask) which had been filled with a Tyrode solution of 37° saturated with O_2. Thus we were enabled to prevent the intestine from being cooled down.

As a rule the movements of the duodenum are somewhat more rapid than those of the ileum. Here, however, we shall give only the average values; the extreme values are not absolutely certain.

I. Intestinal movements of various species of animals: at ca. 36.5°

Animal	Per minute
mouse	32—48
rat	28—35
guinea-pig (cavia)	26—34
rabbit	11—14
cat	10—12
dog	7—11
pig	? 5
cow	? 8

II. After the preceding remarks (effect of the size of an animal) it was not impossible that the *age* of the animal might affect the velocity of the intestinal movements. It might be expected then that the intestines of a young animal would move more rapidly than those of an older animal of the same kind.

The result of these experiments is that only the intestines of the very youngest animals of some species move somewhat more rapidly. A rabbit of 88 grammes for instance (3 days old) had 16—18 intestinal movements a minute. A rabbit of 235 grammes (3 weeks old) had 14

movements a minute i.e. the same number as found in full-grown animals.

III. As yet no support has been found for the opinion that small but full-grown individuals of a certain species have more rapid intestinal motion than bigger individuals of the same species.

The following experiment shows that it is not the size or the age, but the kind of individual which affects the intestinal movements.

The intestine of a half-grown rat of 86 grammes (i.e. as heavy as the above-mentioned rabbit of 3 days) as well as the intestine of a guinea-pig 9 times this weight, (777 grammes) contracted exactly twice as rapidly as the intestine of the rabbit (rat and guinea-pig 35, rabbit 16—18 a minute).

A number of questions are connected with these facts. First the movements of the various parts of stomach and intestinal channel must be compared. Further birds and cold-blooded animals must be examined. These experiments we have partly carried out already. It is not sufficient to study the velocity of the intestinal movements, but it should also be investigated how much labour is performed by the intestine.

In short not only the anatomy, but also the *mechanical function* of the intestine and the various parts of the stomach and intestinal channel must still more be submitted to a *comparative* examination in the different species of animals.

Physiological Laboratory of the
University of Groningen February 1913.

Paleontology. — "*The orientation of the shells of Beyrichia tuberculata* KLÖDEN *sp.*" By Dr. J. H. BONNEMA. (Communicated by Prof. MOLL.)

Among the smaller fossil Ostracoda the best-known is certainly *Beyrichia tuberculata* KLÖDEN sp., illustrations of which are found in nearly all the text-books on paleontology (1, p. 527) and stratigraphical geology (2, p. 130).

From the figures found in these books it appears that these valves present a lateral aspect which is more or less oval. One of the long edges is straight; the other is curved, which is also the case with the two short edges. On the side there are two nodes near one