A Letter on the Anatomy of the Ray$a$

To
The most excellent
Willem Piso
Very successful doctor in medicine,

Very illustrious Sir,
The memory of this day when, spontaneously approving the endeavours of a youth to investigate in Leiden with the very famous Sylvius, you were the first to show me the way to acquire your manifest approval, has not yet left my memory. Although the antiquity counts the ravens among the inauspicious birds, for me indeed, no dissection was ever done more auspiciously than that of an aquatic raven, since nothing would ever meet the expectations and wishes with greater profit. How indeed could I have offered to myself that in the future a gentleman very much praised by all, who had already made his name known for ever by the most desirable and diligent marks of genius and power of judgment, would trouble himself in such a way that not only the training exercise of a youth would be deemed worthy of his presence but that he would liberally offer his love and favour with the kindest words? I have very often admired this singular kindness since, moreover, I noticed that the first achievements had so pleased you that you wanted also to attend our other experiments in Amsterdam. So that I should not seem to ignore so many evidences of a great favour, I judged that I had officially to testify that I was grateful, at least with a little letter. Thus, since I should wish also to join to it other matter of writing so that it would not be insignificant, and I have so far looked in vain for such matter, here is finally a very opportune letter presented on a matter which you mentioned at your house where I had the honour to be. It indeed pleased the very famous gentleman Mr Simon Paulli, physician of the King and prelate of Aarhus, my teacher respectable as

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$a$ OPH 16, vol. I, 195–207: The dissections of two rays, on which “De anatome rajae epistola” is based, must have taken place in Copenhagen shortly after Steno’s return in the spring of 1664.
a father, to admit me to the dissection of a ray on last March 21 of this year. There,
as different matters nice to be seen and pleasant at least to us by their ordinance had
forced our admiration for him, I believed that I should not more properly apologize
for my long silence than by compensating the delay of the letter by the novelty of
these matters.

There were at our disposal two rays both of the same sex but of different size,
although the smaller one was taken by some people for a male because the prolapse
of the intestine through the vulva was deceiving. Hanged from scales, the smaller
exceeded ten pounds whereas the larger did not weigh less than thirty pounds. The
width of the larger one was four and a half spans and exceeded the length or the
straight line from the tip of the mouth to the beginning of the tail by one span.
The inequalities of the diagonals denied the animal a square shape. Neither had it
a rhombic figure since the sides which were equal to each other were not parallel
but concurred to form the same angle.

To those who looked at it from beneath the surface, everywhere besprinkled with
countless black spots (I should have said globules of black glass if they had not
been flat), just as many striae continuing these spots were displayed, although they
were less blackish, because they were more deeply situated. Not only did probing
with a bristle through the hole that perforates the spots disclose that these striae are
hollow like vessels but also the humour contained in these were clearly indicated,
and the expression of humour resembling the vitreous body of the eye through the
orifices of the spots obviously demonstrated that actually they are vessels excreting
through the surface of the body a humour similar to the lymph secreted in the con-
glomerate glands of other animals, in colour as well as in consistence. Those who
trust their senses will easily concede to me that this is that humour which makes the
ray slippery. I should not deserve the trust of all if I said that I arrived at this opinion
not only as a result of this phenomenon but also of several others, since I think that
all other slippery fishes have vessels running through the skin, if not completely sim-
lar, at least analogous to these in some way and, therefore, any small spots scattered
over the surface of fishes must be suspected to have this function. When these are
absent, other small, untinged points must actually be sought for. I should even incur
the disapproval of those who would accuse me of being entirely addicted to a vice
familiar to the anatomists inasmuch as a general conclusion is drawn immediately
from one observation alone. I should have wondered that a liquid as glittering as
the purest lymph is carried inside black ducts and excreted through black orifices, if
I had not seen that very often in the mouth and nose of sheep. And this was obvious
to anybody even without dissection just as was also the various position itself of the
striae, which are very nice in various places.

Some tendinous fibres leave from the muscles lying over the abdomen to the
skin or at least to a membrane tightly attached to the skin, so that they cause the
hands great difficulty of dissection to the one who separates the skin spread over
these muscles. They thus delight much the eyes. Intersecting each other alternately
in a transverse course, they form a very pretty intertwining or, if you prefer, a pattern
not dissimilar from that which microscopes disclose in webs made of a texture not
so delicate. If you have pursued dissecting further and very accurately to the sides,