XIV. *Account of the Organs of Speech of the* Orang Outang. *By* Peter Camper, *M. D. late Professor of Anatomy, &c. in the University of* Groningen, *and F. R. S. in a Letter to Sir* John Pringle, *F. R. S.*

Read January 7, 1779.

SIR,

Klein-Lankum, near Franequer, Dec. 2, 1778.

BEING lately informed by Dr. POEMMERING, whom on account of his singular industry and talents I have recommended to your favour, that you, as well as l'Abbé FONTANA and Dr. INGENHOUSZ, were surprized to hear from M. FEBRONI, the keeper of the Duke of Tuscany's Museum, that I had discovered the true organical reason for which the Orang Outang, and several other apes and monkies, are unable to speak; I take the liberty of addressing to you this anatomical essay upon the organ of speech of the Orang Outang and other monkies, in hopes you will judge it worthy to be read to the Royal Society; in whose most valuable Transactions I should be very proud to see these observations; the rather, as it is the first essay I have offered to that respectable body.

It is this diſcovery (of which I have already given a hint at the end of my Obſervations on the Rein-Deer) which Profeſſor ALLAMAND has inſerted amongſt his additions to the XVth volume of the Count DE BUFFON'S Nat. Hiſt. printed at Amſterdam 1771, for S. H. SCHNEIDER, p. 55, 56. Profeſſor ALLAMAND has moreover added, in the ſame volume, p. 76: *M. le Prof.* CAMPER *a obſervé les organes de la voix de l'Orang; il s'eſt convaincu qu'il étoit impoſſible, qu'il formât des tons articulés, comme les hommes en peuvent former*, &c.

It is aſſerted by a great many travellers, that though the Orang Outang does not ſpeak, he would be able to articulate if he choſe it. Several Naturaliſts ſeem to leave this queſtion undetermined, from not having had the opportunity of diſſecting this very uncommon animal; others again overlook it, being deeply engaged in the reſearches of other parts.

My principal ſtudy in this eſſay will be to prove the abſolute impoſſibility there is for the Orang and other monkies to ſpeak.

§ 1. Being Profeſſor of Natural Philoſophy, Anatomy, Surgery, and Phyſic, in the Univerſity of Franeker in Frieſland, I ſoon perceived the impoſſibility of underſtanding the moſt precious and valuable works of the immortal GALEN (eſpecially his anatomical works) without

without diſſecting monkies, to compare his exact deſcriptions with. I got for that purpoſe, in the year 1754, a Cynocephalus, and was charmed to find the exactneſs of almoſt all GALEN's deſcriptions. The organ of ſpeech puzzled me, nevertheleſs, very much, and I was not able to explain his obſervations, ſo as to ſatisfy myſelf in this animal: I was obliged, therefore, for want of other apes, to delay my reſearches to another opportunity, which, however, I did not meet with till I came to Amſterdam, where I ſettled in the year 1755.

I diſcovered, at the beginning of 1757, in another Cynocephalus, that the baſis of the *os hyoides* was very large and hollow; and that a membranous bag, lying under the *latiſſimi colli* (which touch one another in the middle of the neck in theſe animals) went up into this bony cavity, having a communication with the inſide of the *larynx* by a hole at the root of the *epiglottis*.

The ſtructure of theſe and the Orang will be better underſtood by the four figures engraved after my own drawings for the anatomy of the Orang. I intend to publiſh them with that of the Rhinoceros with the double horn, and the Rein-Deer.

In the Cynocephalus I found the whole organ of voice pretty much like that of dogs, except the pouch *d*, *n*, *o*, *i*, fig. 4. Examining the root of the *epiglottis* I found a hole

hole *i*, *p*, fig. 3. being the real orifice of the bag *d*, *i*, *o*, *n*, fig. 4.

As all this lies above the *rima glottidis i*, fig. 3. or *i*, *h*, fig. 4. I concluded, that the voice, having paſſed the *glottis*, entered this membranous bag, *d*, *n*, *o*, *i*, by which the neck ſwelled, and out of which the air was forced by the contraction of the *latiſſimi colli*. I had often obſerved this ſwelling in ſome living apes, but now found out the reaſon of it, and was perſuaded of the incapacity of this animal to modulate his voice ſo as to articulate words.

I then conſidered this remarkable paſſage of GALEN's, de Uſu Part. Ed. Charter. tom. IV. lib. 7. cap. XI. p. 461. *Foramen in utraque linguæ* (epiglottidis) *parte unum effecit natura, et foramini ipſi parte internâ ventriculum ſuppoſuit non parvum. In quem quum aer vias nactus amplas in animal ingreditur, rurſuſque exit, nihil in ventrem depellitur*; and what he, p. 466. further obſerves, *fiſſuram potius, quam foramen eſſe*.

When I compared this with the organ in the Cynocephali, fig. 3, 4. I was at a loſs how to explain GALEN; for I could by no means apply thoſe *ventriculi*, by which he ſeemed to have underſtood large capacities, to the ſmall holes *h*, *i*, *k*, fig. 4. above the *rima glottidis i*, *h*, which, though much larger in the Cynocephali than in

men, could not be applied to this very particular definition of no ſmall bags, *ventriculum non parvum*.

In November 1758 I diſſected another monkey, in which the membranous bag, *d*, *n*, *o*, was much larger, ſo as to occupy almoſt the whole fore part of the neck, under the *latiſſimi colli*.

In the *Apella* (the 29th ſpecies of LINNÆUS, Syſt. Nat. ed. XII. p. 42. or *ſimia caudata imberbis, cauda ſubprehenſili, corpore fuſco, pedibus nigris*) was no ſuch a bag at all, nor any opening at the root of the *epiglottis*, which was entirely ſimilar to that of dogs. I cannot forbear to mention, that in this monkey the *meatus*, or the *proceſſus peritonæi*, were cloſed as in men. This I diſſected in the year 1768, when I was Profeſſor in the Univerſity of Groningen.

Here I got the opportunity, the year following, of diſſecting two *papiones* or *ſphinges* of LINNÆUS, *ſimiæ ſemi caudatæ ore vibriſſato unguibus acuminatis*, ſpec. 6. p. 35. a male and a female; in which the *epiglottis* was likewiſe perforated, the *os hyoides* as in the former, but the pouch very ſmall in compariſon of the apes, who were very large.

As theſe parts are ſo apparent in a great many monkies, and likewiſe in the ape or *Pithecos*, I was very much ſurprized EUSTACHIUS did not diſcover them, eſpecially as

as he had taken great pains to purſue the anatomical doctrine of GALEN, as appears in the XLIſt plate, where he has given ſeveral figures of this organ. I was no leſs ſurprized that ALBINUS and MARTINS did not find this bag; and I wondered likewiſe very much, how Mr. D'AUBENTON, who has had the greateſt opportunity of any anatomiſt, could paſs over ſo ſtriking a conſtruction of this organ. I do not mention RIOLANUS, FALLOPIUS, GORTER, SYLVIUS, BLASIUS, and ſome others, becauſe they had fixed their attention upon quite different parts.

§. 2. As GALEN not only diſſected the *Cebi*, or the Cynocephalus, who are all of the tailed or *caudati* kind, but the *Pithecos* or ape without a tail; and as the celebrated Dr. TYSON had found the organ of voice ſo ſimilar to that of men in his *Pigmy*, I endeavoured to get one from the Eaſt Indies. For this purpoſe I offered a good ſum of money to my correſpondents to have a well-preſerved Orang Outang, becauſe none were to be met with in any collection of Natural Hiſtory in Holland.

I ſoon got a female one in the year 1770, by the kindneſs and generoſity of Dr. HOFFMAN, phyſician at Batavia, formerly my pupil; and the year 1771 another, by favour of Mr. HOPE, Director of the Eaſt India Company of Amſterdam, and Repreſentative of his Moſt Serene Highneſs the Prince of Orange in the ſame Company,

who was ſo good as to order not only a female, but a male one for my uſe; but this laſt was unluckily loſt, with the whole ſhip, betwixt Java and the Cape of Good Hope.

Theſe and the ſucceeding years were very favourable to Naturaliſts; for Profeſſor ALLAMAND got a male Orang for the Muſeum of the Univerſity of Leyden; Mr. VANDER MEULEN, a great admirer of natural hiſtory (who has one of the fineſt collections at Amſterdam) received one, and Mr. VOSMAER got two for the celebrated collection of the Prince of Orange, all females. In the year 1777, Dr. VAN HOEY (a phyſician of great celebrity at the Hague, who has a very rich collection of natural curioſities) got a male (but a very young) Orang. Upon the whole, I had an opportunity of ſeeing ſeven Orangs, beſides the living one, which was ſent to his Highneſs the Prince of Orange.

All theſe reſembled perfectly in ſhape and colour that of Mr. EDWARDS, which is ſtill preſerved in the Britiſh Muſeum.

Seven of thoſe, I had ſeen, had no nails upon the great toes of the feet: it ſurprized me, therefore, to ſee them ſo diſtinctly repreſented by Profeſſor ALLAMAND. I took the liberty to inform him of it; he corrected his deſcription accordingly, p. 75. *ib. in fine*, which was eaſily

done, as the ſheets were not worked off at the preſs. I wrote likewiſe to Dr. KOOYSTRA, phyſician to the London Infirmary, to inquire about the Orang in the Britiſh Muſeum. The late Dr. MATY examined, at my requeſt, the Orang with him; and both declared, that not a ſingle mark of a nail was to be found upon the large toes of that ſpecimen, though Mr. EDWARDS had repreſented them on his 213th table ſo very large. Theſe two inſtances ſhew us, how little we can depend upon figures, if not drawn with great exactneſs.

The want of theſe nails, and of the ſecond phalanx of the large toes, is beyond any doubt a very remarkable character in this animal. Nature, however, ſeems to be inconſtant ſometimes; for, upon the great toe of the right foot of the Orang in Dr. VAN HOEY's collection, there was a little nail and two phalanges. The ſingular red, long hair, and the ſhortneſs of the neck, form another very peculiar property; for in the living, as well as in all the reſt, I have obſerved the ſhoulders to riſe up to the ears; the lower and upper jaws were much projected forwards, as I ſhall ſhew in the anatomical deſcription of the Orang. The country they all came from was Borneo, from which iſland they are firſt ſent over to Java, and ſo to Holland by the Cape of Good Hope.

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The Orang Outangs deſcribed by TULPIUS and TYSON came from Angola, and had both black hair, and large nails upon the great toes. I own the figures of theſe great men are very deficient in many reſpects: but, upon the whole, the animals are repreſented and deſcribed as very ſtrong and muſcular; whereas all the Orangs from Borneo, I have ſeen, were the contrary, and had long and very lean arms and legs.

To conclude, it ſeems very probable, that Africa furniſhes a peculiar ſort of apes which are not the *Pithecos* of the ancients, though theſe are not uncommon in Angola.

The organs of voice of the Angoleſe Orang, diſſected by TYSON, are very different from thoſe of the *Pithecos* which I diſſected 1777. This one had the *os hyoides* like all the *papiones* or *ſphinges*, &c.; the *epiglottis* perforated as in fig. 3. and 4. and therefore different from GALEN's deſcription, and from TYSON's, who makes no mention at all of the one, nor of the two bags which GALEN deſcribes, and which I found in the real Orang of Borneo; not only in one ſpecimen, but in five, which I have diſſected for that purpoſe.

To return to GALEN; I am very apt to think that he diſſected an Aſiatic Orang, from whom he took his deſcription of the ventricles *a latere linguæ*, at the ſides of the *epiglottis*; at leaſt that he diſſected ſuch an organ, for

the bones of the *carpus* do not entirely agree with his deſcription, though he ſeems to have been very exact and nice in his diſſections. And indeed I wondered as often as I compared the ſtructure of the *carpus* and *tarſus* of apes, monkies, and dogs, with GALEN's *oſteological* performances upon this ſubject: for though he deſcribes but eight bones in the *carpus*, he mentions the ninth, which I have met with in all monkies, apes, and dogs, and likewiſe in the Orang. The tenth is not eaſily ſeen, it being very much attached to the *os naviculare*. Theſe bones I ſhall give the explanation of in the anatomical deſcription of the Orang.

In the Angoleſe Orang, Dr. TYSON met with the vermicular proceſs of the *inteſt. cœcum*, which I found very conſiderable in the Aſiatic; but of which GALEN appears not to have had the leaſt notion. Mr. D'AUBENTON has given the deſcription and figure of the ſame little gut in the Gibbon, a ſpecies approaching to that of the Orang, and likewiſe an inhabitant of Aſia, but alſo unknown to GALEN.

§ 3. I ſhall now proceed to the organ of ſpeech itſelf, and deſcribe it as it appeared in the firſt Orang I diſſected in October 1770. And for the clearer underſtanding I ſhall add ſome figures to it; firſt, of the fore-part; ſecondly,

ſecondly, of the *larynx* from the inſide of the *pharynx*; and, laſtly, of the inſide of the *larynx* itſelf.

Fig. 2. N, O, P, repreſents the *os hyoides*; N, O, the baſis; P the left *cornu*; N, O, the little graniform bones.

Q, T, U, the *thyroid* cartilage; V the *aſpera arteria*.

Z, X the right ventricle cut open; R, S the left.

Y the hole leading into the bag. The ventricles form here a kind *meatus*, paſſing over the brim of the *thyroid* cartilage, under the *os hyoides*, towards the inſide, where they form the fiſſures *a*, *b*, and *a*, *i*, fig. 5. I diſſected this in the Anatomical Theatre of the Univerſity at Groningen in public.

In a ſecond, which Mr. VOSMAER, the keeper of the Prince of Orange's cabinet, was ſo kind as to grant me for diſſection, I found both theſe ventricles the ſame in every reſpect as the others, except that theſe laſt were of equal ſize.

In the third, which I diſſected at the houſe of Dr. VAN HOEY at the Hague, the 31ſt of Auguſt, 1777, the two ventricles were ſmaller but of equal ſize on both ſides. The animal was very young. The doctor preſerves this preparation in his muſeum.

In a fourth, which I preſerve intire in my collection, but whoſe organ of voice I examined the 30th of November

vember laſt, I found both the ventricles united ſo as to form but one.

The 6th figure gives a ſketch of it; *a*, *c*, *d*, *e*, *f*, *g*, *h*, *b*, is the ventricle, having, nevertheleſs, the two *meatus's* *a* and *b*, and ſhewing evidently a kind of diviſion in *i*; *g*, *h*, making a ſmaller bag.

This bag deſcended downwards to the middle of the breaſt bone, and ſpread itſelf ſidewards over the *ſterno-maſtoideus*, with appendices underneath the *cucullares*.

The *latiſſimi colli* adhered very much to the fore-part, but ſidewards; and under, from the muſcles of the neck, they were eaſily ſeparated by tearing gently, either with the top of the finger, or with the flat part of the handle of a diſſecting knife.

As this Orang was much larger than the former ones, and conſequently older, I dare not venture to determine, whether theſe ventricles or bags, which touch each other in the middle, grow together, ſo as to make but one bladder; or whether this may be a variety: becauſe in the Orang which was alive at the Hague, and the hiſtory of which I ſhall give by and by, there was likewiſe but one bag ſtill larger than theſe, and proceeding far over the *clavicles*, backwards under the *cucullares*, and before down two-thirds of the breaſt bone.

This accidental union can probably make no eſſential variety; for as theſe receptacles of air do not ſeem to ſerve for any modulation of voice, they will anſwer their proper purpoſe, whether united into one, or divided into two cavities. We very often ſee the kidnies united at the lower ends acroſs the ſpine in men, without its occaſioning any diſturbance in the ſecretion or animal economy.

§ 4. I muſt now give the hiſtory of the ſo much celebrated Orang which belonged to the Prince of Orange, and died in January 1777. This was a female; when alive the head was always deep in the ſhoulders, and the animal ſeldom lifted it very high up. The man who took care of her obſerved a great quantity of air under the ſkin of the neck on both ſides, which (being ignorant of theſe ventricles) he took for a dangerous diſorder, and the ſymptoms of approaching death. I felt the neck myſelf in December 1776, and diſcovered the bags to be much larger than any I had diſſected. I could remove the air eaſily with my hand from one ſide to the other, and divide it, as it were, into two parts. The bags appeared ſometimes very turgid, ſometimes collapſed.

She died not long afterwards, and was ſoon cut to pieces by the order of Mr. VOSMAER, to be ſtuffed for the Muſeum of his Serene Highneſs the Prince of Orange; but, as this cannot be done without preſerving the face, a part of the ſkull, hands, and feet, it is very evident, that Mr. VOSMAER

was

was obliged to cut off the head and the other extremities, and to deſtroy the moſt intereſting parts for natural knowledge.

I was very ſorry to hear the fate of this curious and uncommon creature, more eſpecially as I had great reaſon to flatter myſelf with the diſſection of the entire animal as ſoon as it was dead.

I need not remind any one of the particulars mentioned by Mr. FORSTER in the 2d volume of a Voyage round the World, p. 553.; nor of his rather too ſevere criticiſm upon the conduct of Mr. VOSMAER, the inſpector of the Muſeum belonging to the hereditary Stadholder of the United Provinces. Mr. VOSMAER had, without doubt, no other intention but to preſerve the freſh ſkin of this uncommon animal ſtuffed, for the cabinet of his benefactor, and not the leaſt malevolent intention to prevent the diſſection of the other parts not neceſſary for this purpoſe: for, when, by a ſpecial order of his Moſt Serene Highneſs the Prince of Orange, the remaining trunk was ſent to me, I found the organ of voice not in the leaſt hurt, and quite entire, as it is ſtill to my great ſatisfaction. After having duly examined, diſſected, and delineated the *viſcera* of the breaſt and belly, I have put it in melaſſes, in a fine phial, in order to preſerve ſo valuable a preparation, not only for my muſeum, but for natural knowledge in general.

There

There was no difference betwixt this organ and that [I] delineated in the 6th figure, but in extent. The united ventricles covered the greateſt part of the breaſt bone, and had ſeveral appendices, which inſinuated themſelves into all the interſtices of the muſcles of the neck and ſhoulders.

It had likewiſe two diſtinct *meatus's* coming from the inſide of the organ at the ſides of the *epiglottis*, as in fig. 5. and paſſing between the *os hyoides* and *thyroid* cartilage.

A large and vermicular proceſs was attached to the *cœcum*; but the inteſtines were very different on the inſide from thoſe of men. The *os femoris* was kept in its ſocket only by a ſtrong capſular ligament, there being no *ligamentum teres*: I had not obſerved one in the Orang which I preſerve, and whoſe feet I diſſected, to compare them with GALEN and others.

§ 5. Having given the ſtructure of the organ of voice in five different Orangs, and demonſtrated their conformity in every other reſpect but the union I mentioned in ſome, I ſhall proceed now to the internal part of the organ, as it is deſcribed by GALEN.

Fig. 5. ſhews the inſide of the organ, which is repreſented in fig. 2. conſequently of the ſame Orang.

d, *e*, *f*, is the *epiglottis* or *lingula*.

g, *b*, *k*, *l*, the *cricoid* cartilage, divided in the middle, and expanded ſidewards.

b, *d*, *h*, and *g*, *i*, *f*, the *arytenoid* cartilages.

i, *a*, and *a*, *b*, the holes or fiſſures at each ſide of the *epiglottis*; *b* and *i*, the cords which form the *rima glottidis*. All this anſwers exactly to the deſcription given by GALEN.

The air which is forced by expiration out of the lungs, and paſſes with an accelerated velocity the *rima glottidis*, *b*, *i*, being ſtopped by the hollow *epiglottis* and the roof of the mouth, narrow noſtrils, &c. ruſhes into theſe ventricles z, x and q, r, s fig. 2. or into the united large ventricle *a*, *b*, *d*, *e*, *f*, *g*, fig. 6. Theſe are, as GALEN rightly obſerves, ſeemingly within the animal; for they are covered with the external integuments and the *latiſſimi colli*. From thence, or out of theſe ventricles, the air gets out again by the ſame fiſſures *a*, *i*, *a*, *b*, fig. 5. through the mouth and noſtrils, without entering into the lungs again, or, as he expreſſes it, without entering into the belly of the animal, *rurſuſque exit, nihil in ventrem depellitur*; by *venter* is to be underſtood the inſide of the body.

If this organ does not anſwer entirely to the deſcription of GALEN, I do not know how to explain the quotation; for there is no animal, as yet known, whoſe organ

of

of ſpeech is more applicable to it, at leaſt none of the monkey kind, as I obſerved before.

It is hardly to be conceived, how Dr. TYSON ſhould have overlooked all this, and have pronounced the organ of voice of his pigmy to be exactly like that of men, as he has done p. 51.; and yet, it is not impoſſible, when we conſider that he has overlooked other and more ſtriking differences in his eſſay.

Nor is it probable that GALEN ſhould have overlooked the large vermicular proceſs of the *cœcum* and other things, if he had diſſected the ſame kind of African Orang as TYSON did, unleſs he diſſected the Organ of voice in the one, neglecting the inteſtines, and again the bones of the feet in another, as is often the caſe with anatomiſts, as I know by my own experience. This, however, ſeems probable, that GALEN diſſected more than one ſpecies of *pithecos* or apes without a tail, and that even that ſpecies was different from the Angoleſe pigmy and from the Orang of Borneo.

§ 6. Having diſſected the whole organ of voice in the Orang, in apes, and ſeveral monkies, I have a right to conclude, that Orangs and apes are not made to modulate the voice like men: for the air paſſing by the *rima glottidis* is immediately loſt in the ventricles or ventricle of the neck, as in apes and monkies, and muſt conſe-

quently return from thence without any force and melody within the throat and mouth of theſe creatures: and this ſeems to me the moſt evident proof of the incapacity of Orangs, apes, and monkies, to utter any modulated voice, as indeed they never have been obſerved to do.

I have already mentioned in the anatomical deſcription of the Rein Deer (p. 55. of Mr. ALLAMAND's addition to the XVth volume of the Count DE BUFFON) the ſurprizing analogy of its organ of voice with that of the *Pitheci* and *Cercopitheci*. That of the Orang ſeems to have ſome analogy with that of frogs, whoſe voice, however, can be better modulated by their tongues. I have given a deſcription of them in the Memoirs of the Society of Rotterdam. As I am afraid of having dwelt already too long on this ſubject, I ſhall here finiſh this eſſay; but promiſe to ſend the Society an account of the very extraordinary organ of voice of the *alouate* or *hurleur de Cayenne*, the *Simia Capucina* of LINNÆUS, *n.* 30. p. 42. the organ and *os hyoides* of which, &c. I diſſected ſome time ago with all poſſible care and attention.

I am, &c.

EXPLA-

EXPLANATION OF THE FIGURES.

Fig. 1. repreſents the *pharynx* of the Orang Outang, from which the organs of voice, fig. 2. and 5. are delineated.

A, D, B, C, the tongue from behind.

D, B, C, M, the *palatum molle*, on the back part of which the *uvula* B, L is ſeen.

B, E, G, H, F, the *pharynx*, divided lengthways in the middle from E to G.

K, M, J, the paſſage from the mouth into the *œſophagus* S, K, G, H. Within this is ſeen the *epiglottis* and the *glottis* ſhut by the *arytenoid* cartilages.

Fig. 2. is the ſame organ of voice from the fore-part

N, O, P, the *os hyoides*; N and O the little graniform bones; P, the left *cornu*.

Q, T, U, the *thyroid* cartilage; V the *aſperâ arteria*.

R, S, the left ventricle intire.

W the right, cut open to ſee the orifice of the duct r from the bag.

Fig. 3 The back part of the tongue and the *glottis* of a monkey.

a, *b*,

a, *b*, the *epiglottis*; *a*, *b*, *r*, *g*, the root and back part of the tongue; *c*, *s*, *t*, *d*, the *œſophagus* laid open.

u, the *aſpera arteria*.

f, *e*, the *capitella* of the *arytenoid* cartilages.

e, the upper part or top of the little cartilage between the *arytenoid* cartilage and the *epiglottis*, which I have likewiſe met with in men, but leſs prominent.

i, *f*, the *rima glottidis*.

p, *i*, the hole at the root of the *epiglottis*.

Fig. 4. the inſide of the *larynx* in profil.

a, *b*, *c*, *d*, the *epiglottis*; *e*, the cartilage mentioned in fig. 3.

f, *h*, the *arytenoid* cartilage; *f*, *g*, the *capitellums* forming a kind of crooked hook.

i, *m*, the cord of the *glottis*.

i, *k*, *h*, the lateral *ſinus* above the *rima glottidis*, forming a pretty large ventricle in theſe animals.

i, *m*, *l*, the *cricoid* cartilage.

d, *n*, *o*, the ventricle, into which the air, coming through the hole at the root of the *epiglottis*, enters.

Fig. 5. the ſame *larynx*, repreſented in fig. 1. opened, to ſee the inward parts.

a, the union of the cords forming the *rima glottidis*.

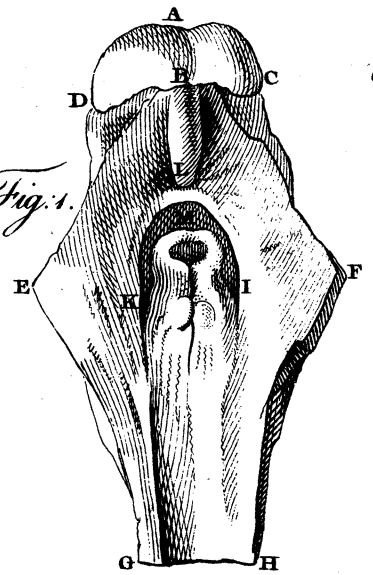


Fig: 1.

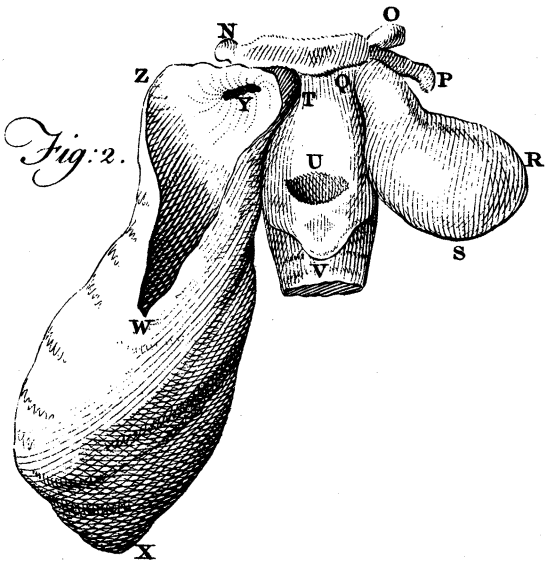


Fig: 2.

Fig: 6.

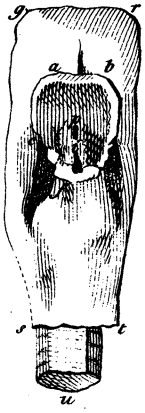


Fig: 3.

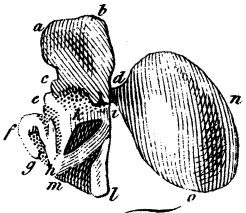
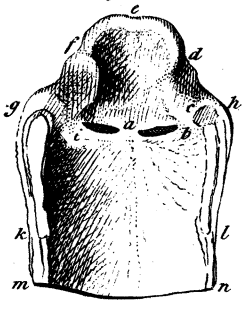


Fig: 4.

Fig: 5.



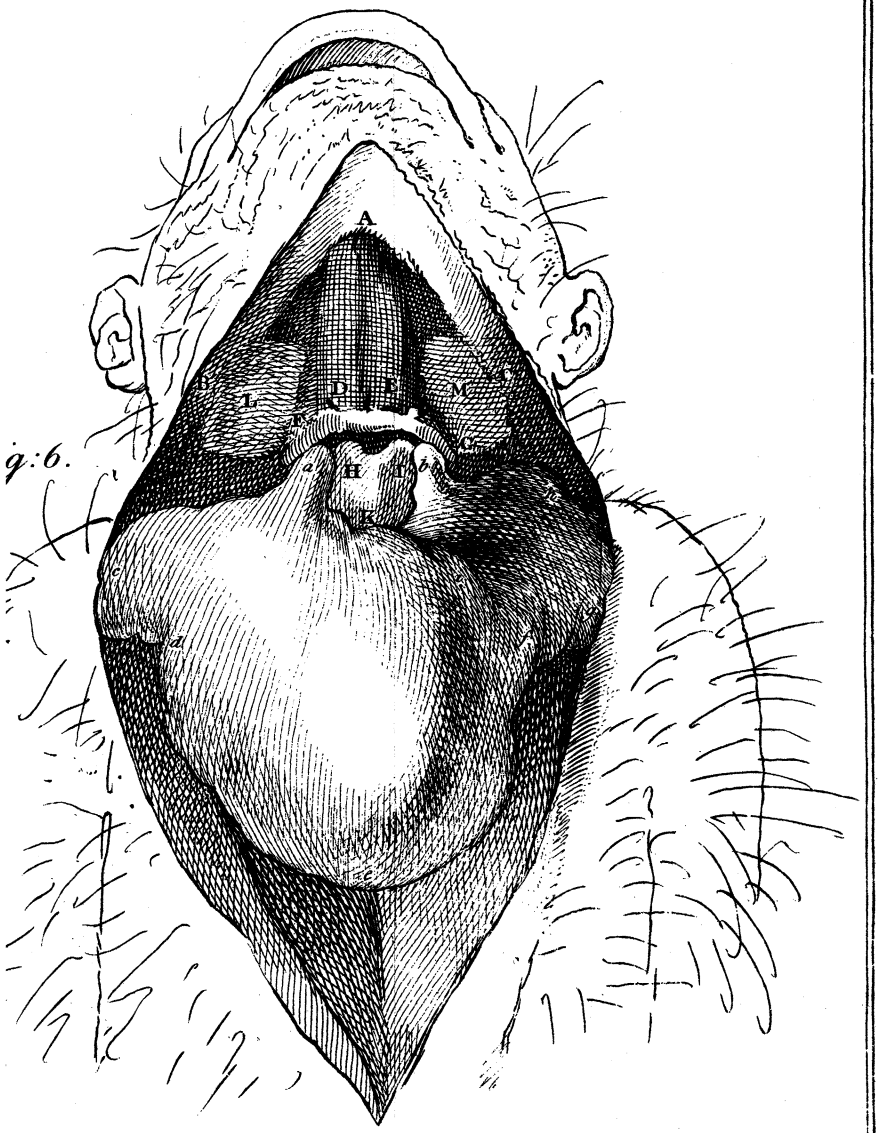


Fig. 6.

a, *b*, *a*, *i*, the holes or orifices by which the air enters into the two ventricles R, S and Z, X, fig. 2.

b, *c*, *b*, *d*, the right *arytenoid* cartilage, with its *capitellum d.*

i, *g*, *f*, the left *arytenoid* cartilage.

f, *e*, *d*, the *epiglottis.*

g, *h*, *k*, *l*, the *cricoid* cartilage, divided and dilated.

k, *m*, *n*, *l*, the wind-pipe.

Fig. 6. the fore part of the Orang, which I preſerve entire in my muſeum. The ſkin of the neck and the *latiſſimi colli* are laid open, to ſhew the ventricles, &c.

A, B, C, the lower jaw-bone; A, D, A, E, the *genio hyoides.*

F, G, the *cornua* of the *os hyoides.*

H, I, the *thyroid* cartilage; K, the *cricoid.*

L, M, the ſub-maxillary glands.

a, *c*, *d*, *e*, *f*, *g*, *h*, *b*, the large bladder formed by the union of the two ventricles, of which *i*, *f*, is a mark.

a and *b*, the two *meatus's* entering towards the inſide of the *larynx*, betwixt the *thyroid* cartilage and the *os hyoides.*

Fig. 1.

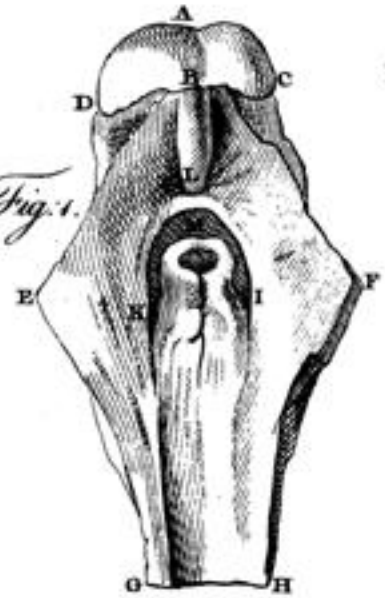


Fig. 2.

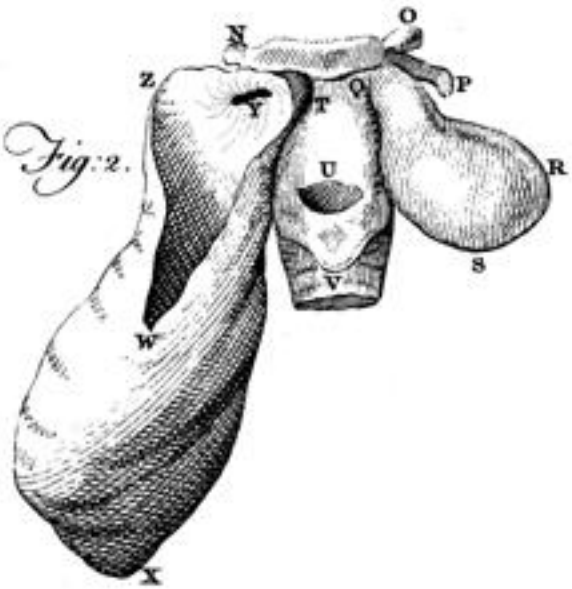


Fig. 6.

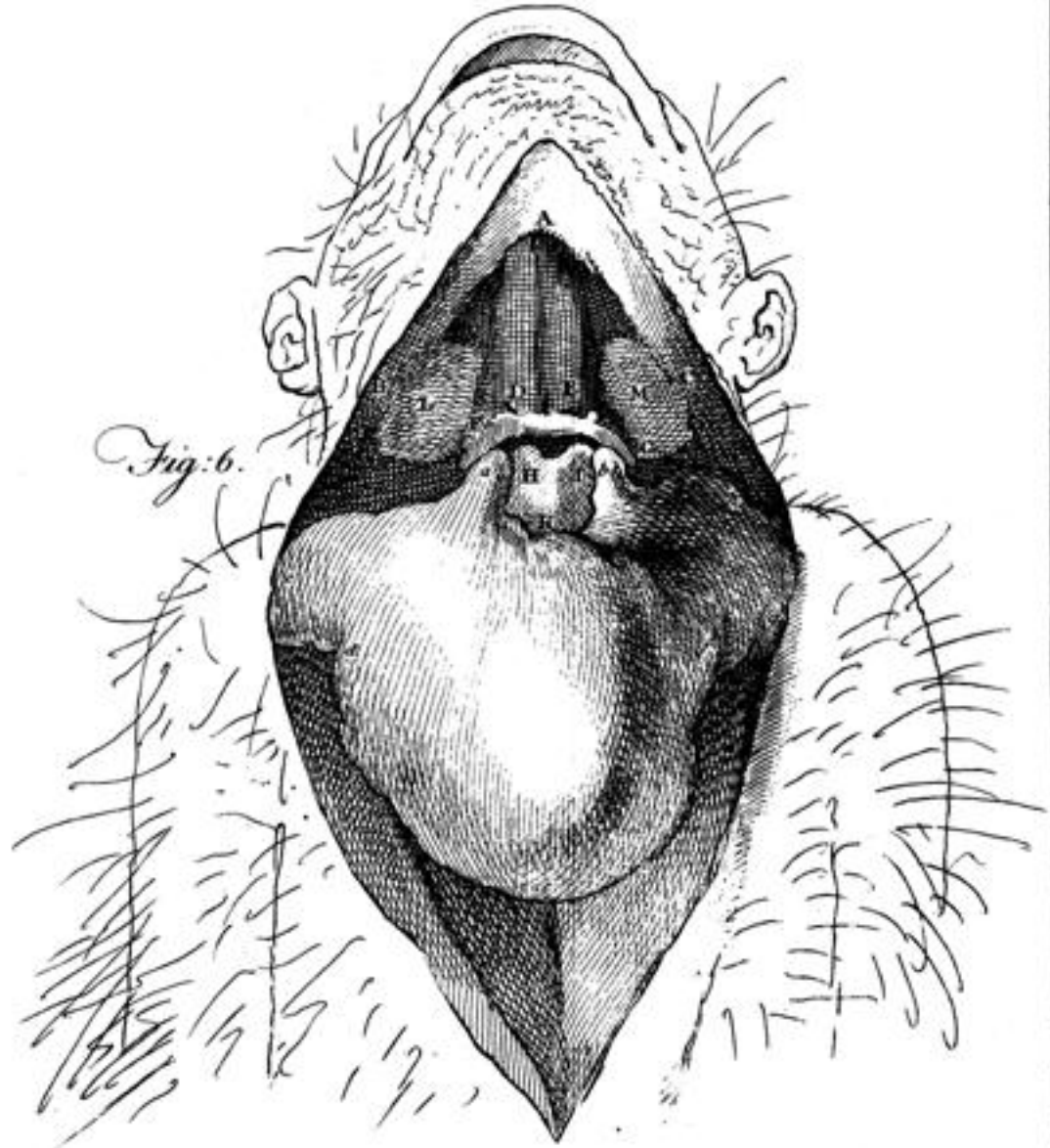


Fig. 3.

Fig. 4.

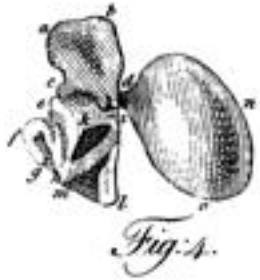


Fig. 5.