

## 研究論文

# 白鳥の解剖図譜

(コハクチョウの幼鳥)

PICTURE OF ANATOMY AT WILD SWANS.

(*Cygnus columbianus jankowskii*)

(Cygnet)

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Lake Inawashiro wild swans conservation Association.

大 森 常 三 郎

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### はじめに

この図譜は、日本白鳥の会々員および同好の友の要望にこたえて編集したものである。

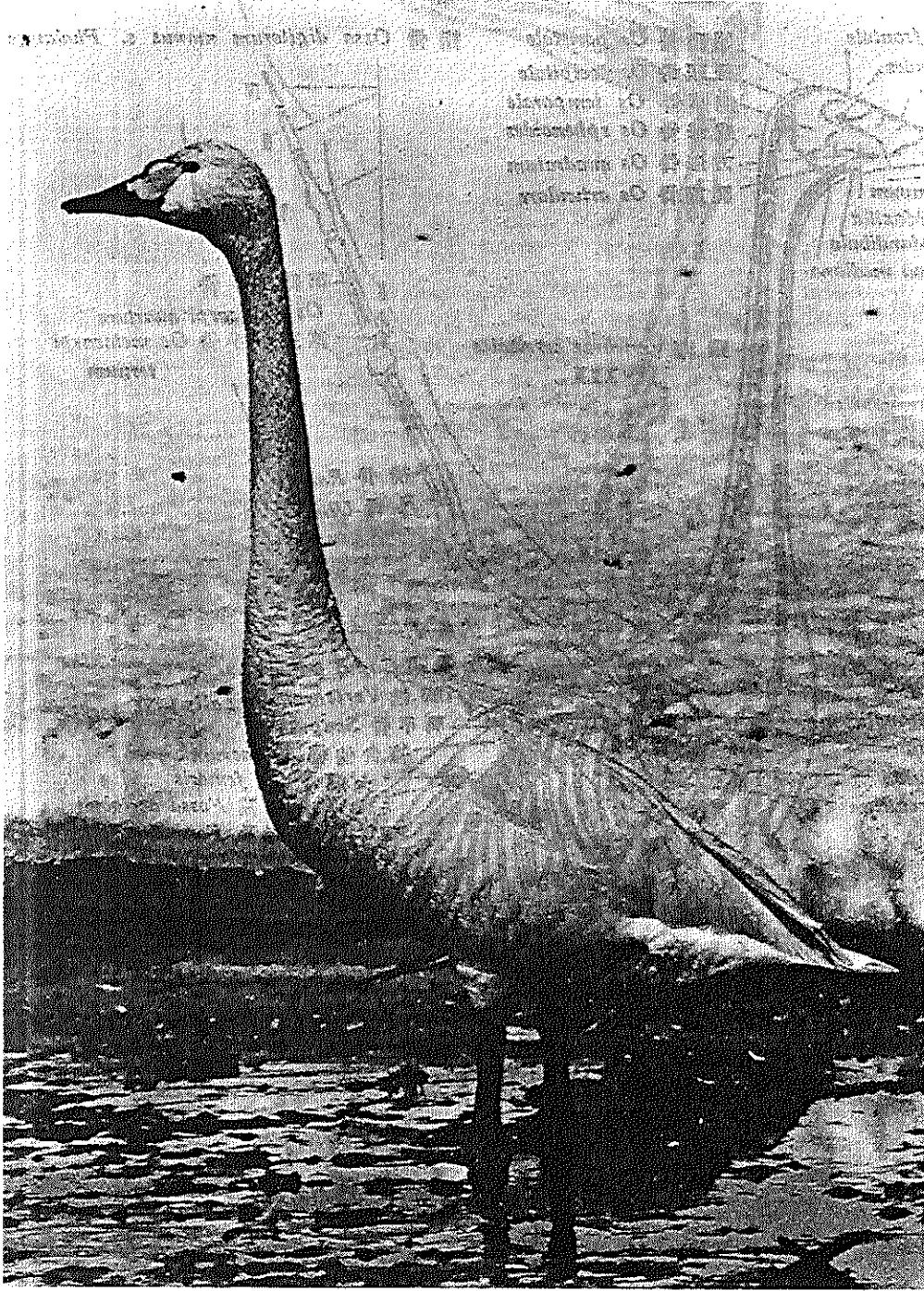
あの優雅な白鳥を観察しているうち、様々な疑問が浮びあがってくる。彼等の行動は、如何なる構造で、北極海沿岸と日本々土の間の長旅が可能なのか？ 私自身も知りたかった。

内容は極めて通俗的な部分を捉え、専門的なものを省き、興味ある部分と独特な構造についてのみ解説をつけた。

(註)

各部位の名称は、日本語の外、PNA(国際解剖用語)、ラテン語(イタリック字体)および英語、独逸語を用いている。

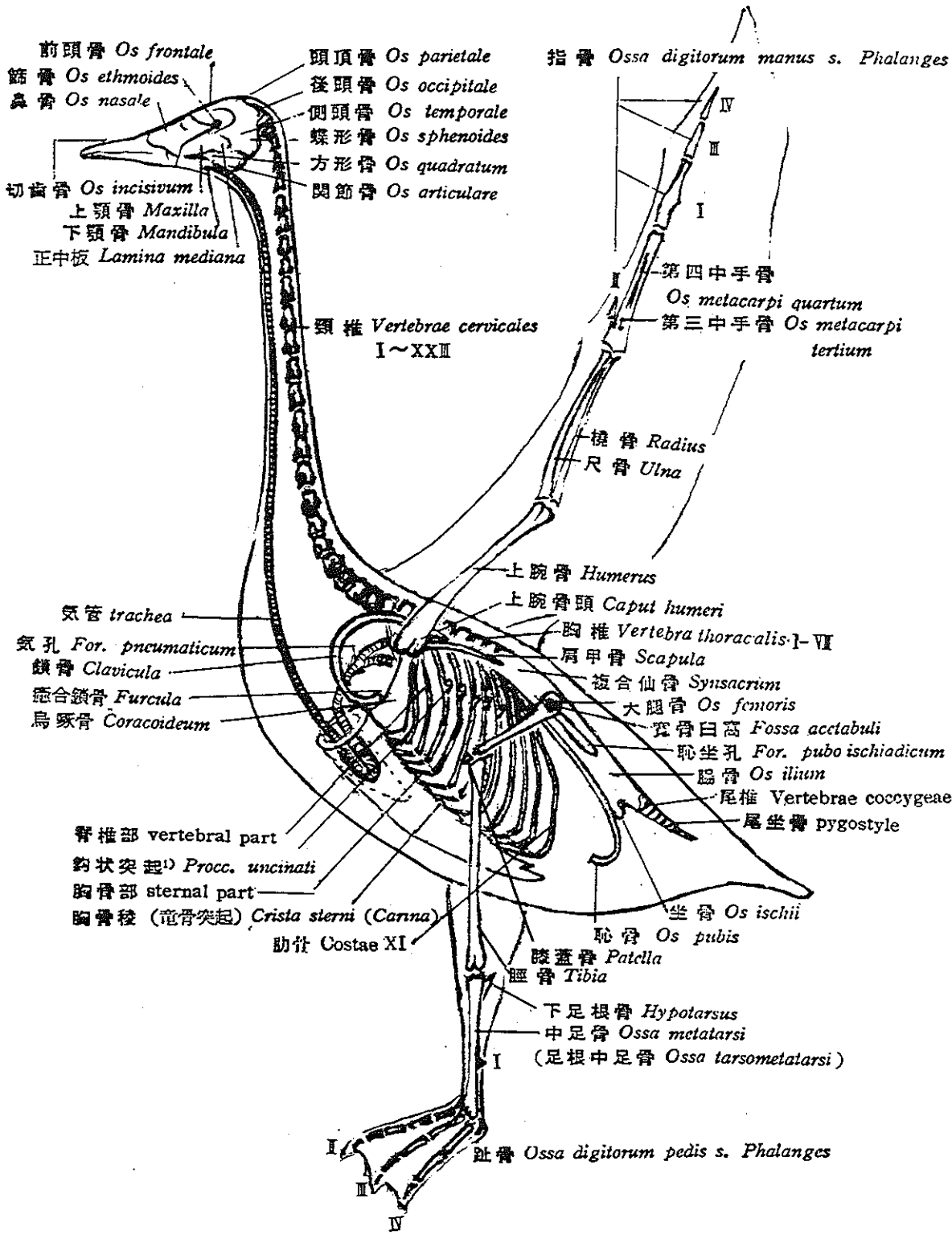
写真 Plate. コハクチョウ Jankowski's swan



(*Cygnus columbianus jankowskii*)

第 I 部 PART I  
骨 格 OSSIFICATION

概念图 CONCEPT PICTURE.

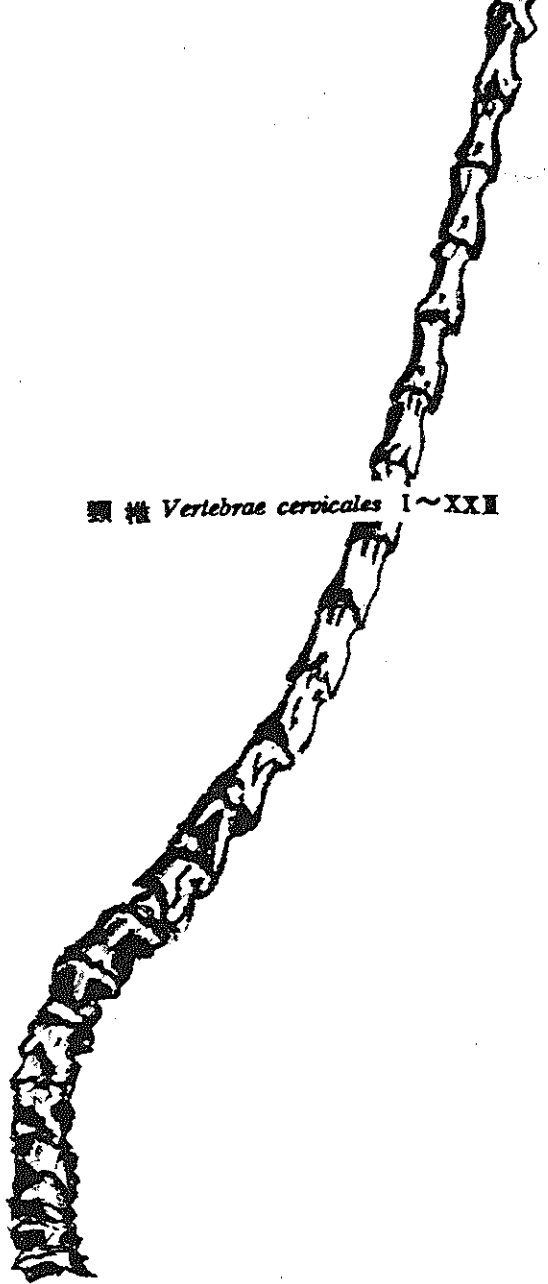


頭と頸 CRANIUM AND CERVIX.

頭蓋骨 *Ossa cranii*

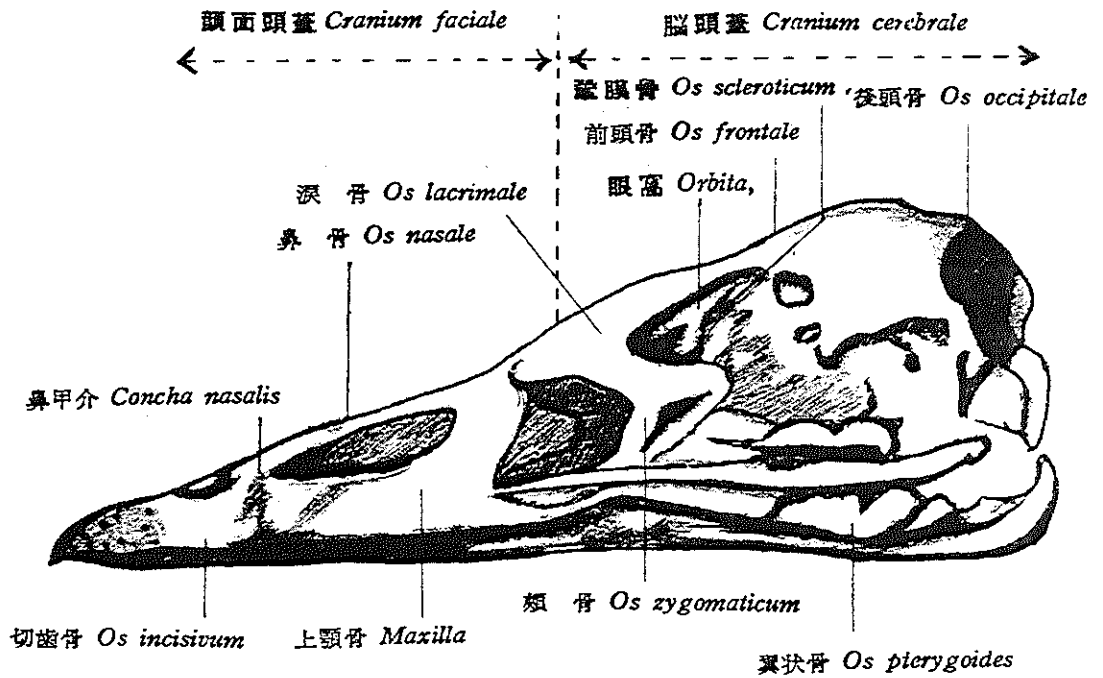


頸椎 *Vertebrae cervicales* I~XXII



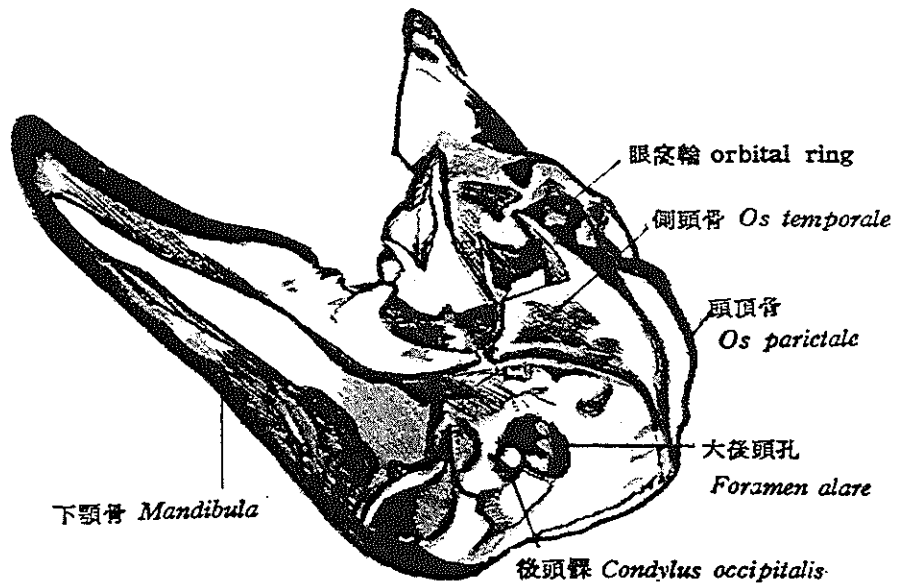
頭骨 CRANIUM.

(側面) Left Laterl.



(後前斜側面)

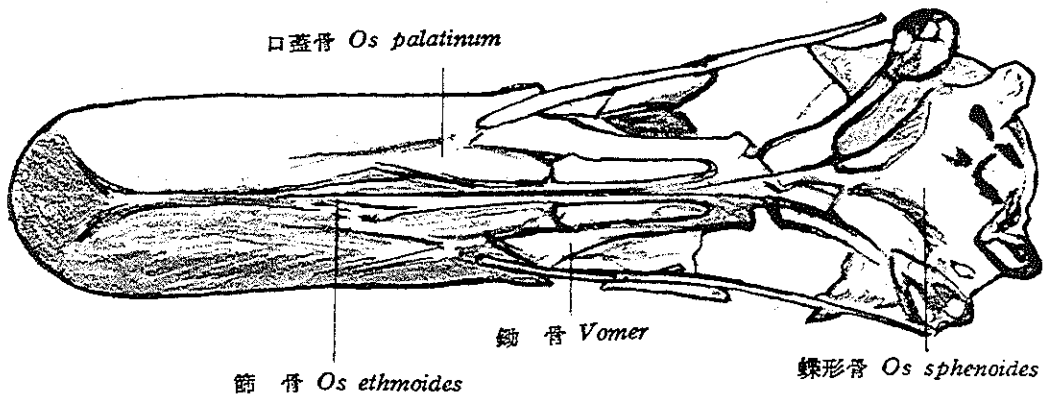
Posteroanterior Laterl Oblique.



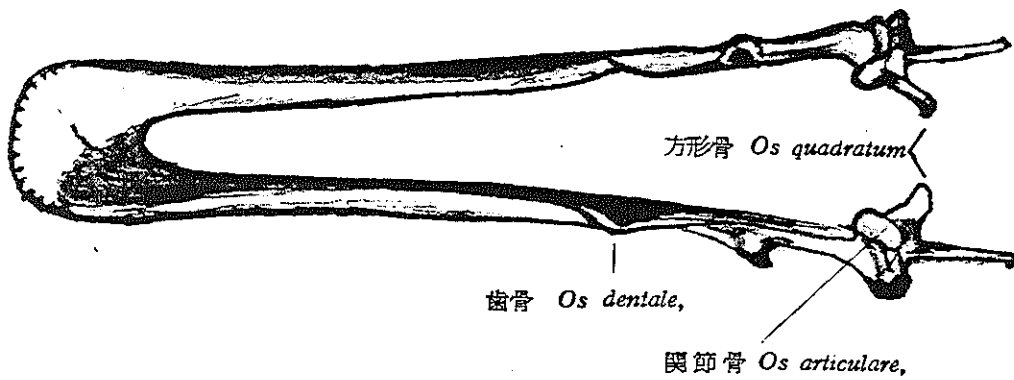
頭骨 CRANIUM.

(內側) Medial

上顎骨 *Maxilla*



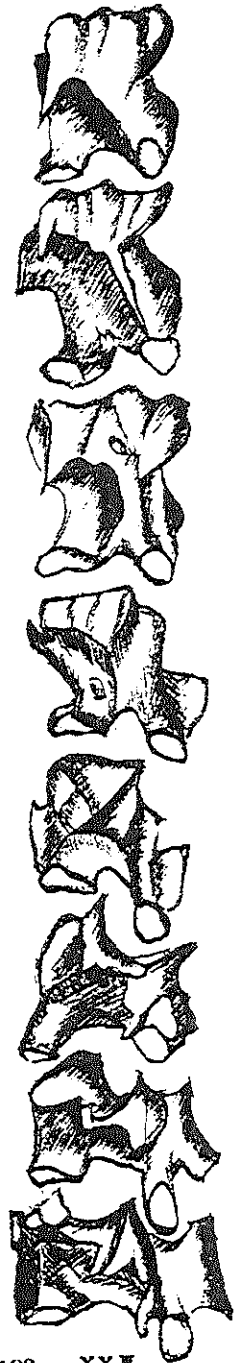
下顎骨 *Mandibula*



頸 椎 CERVIX.  
I~XXII

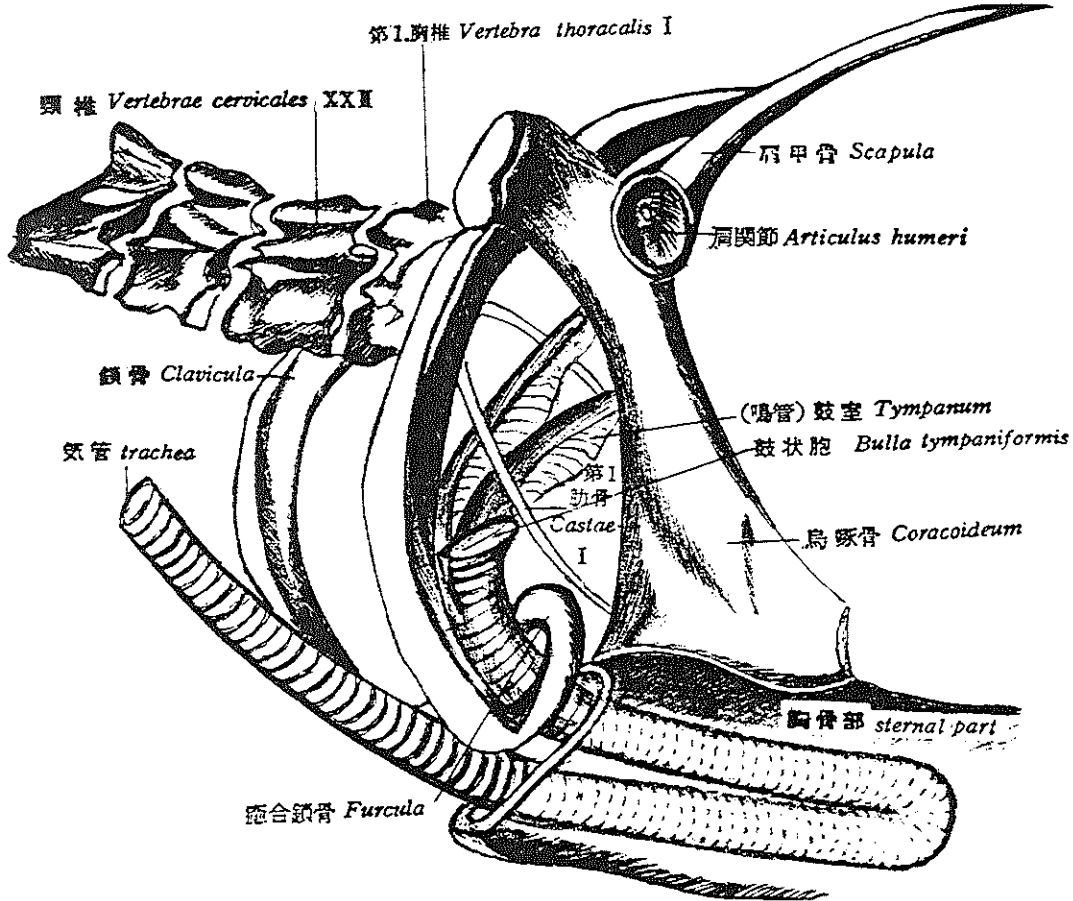
(左側) Left Lateral.

環椎  
第1頸椎 Atlas (V. cervicalis.I)



第23 XXII  
頸椎 *Vertebrae cervicales*

胸部 THORACIC.  
Antero Lateral Oblique



胸部骨格

白鳥の胸部骨格は、翼を激しく運動することゝ、飛翔高度、同距離が大きく且つ低温を好む等から胸骨の発達には他の鳥類に比較しよく発達している。更に龍骨突起が突出して部厚い筋の附着（スタミナの貯蔵庫となるもの）し強化されている。

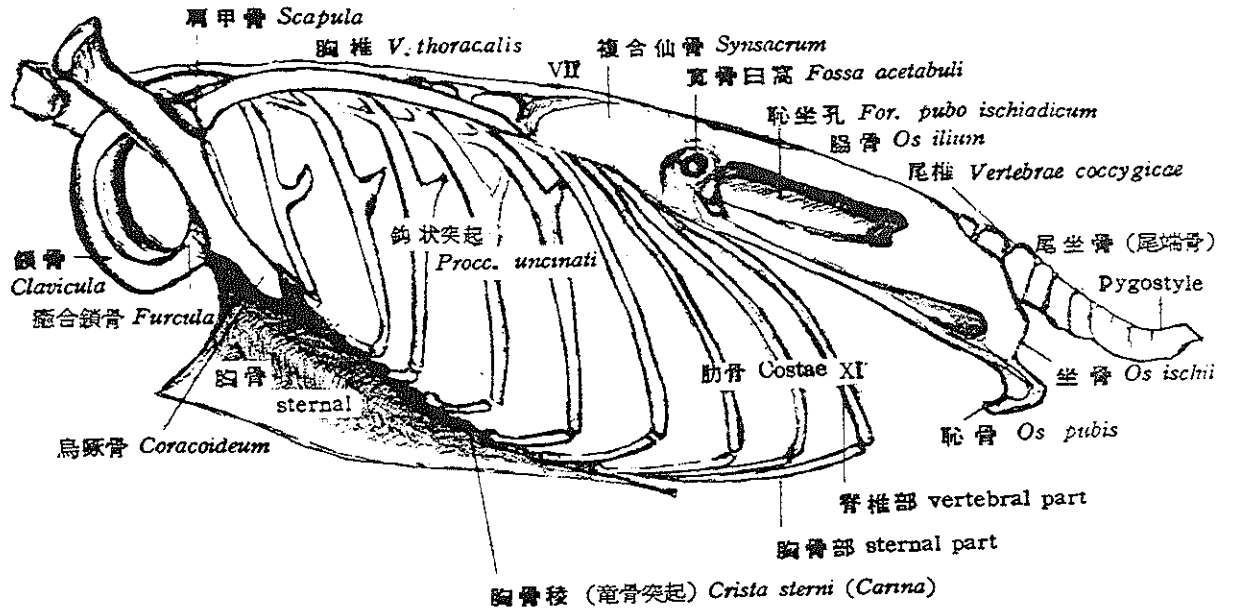
THE SKELETAL STRUCTURE OF THORAX.

The skeletal structure of thorax of swans is much more developed than that of other birds. This is just because swans move their wings furiously, and their flying altitude having a long flight capability is really high, and also, they prefer being in a low temperature to being in a high temperature. In addition to that, their keel comes out, in which a thick muscle is attached (this becomes a storage for their stamina) and strengthened.

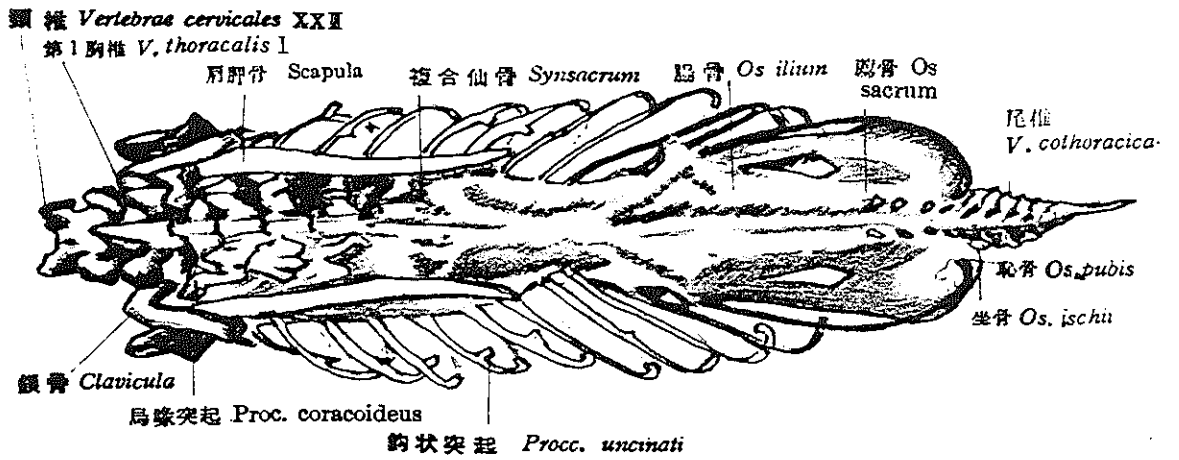


胴骨 BODY.

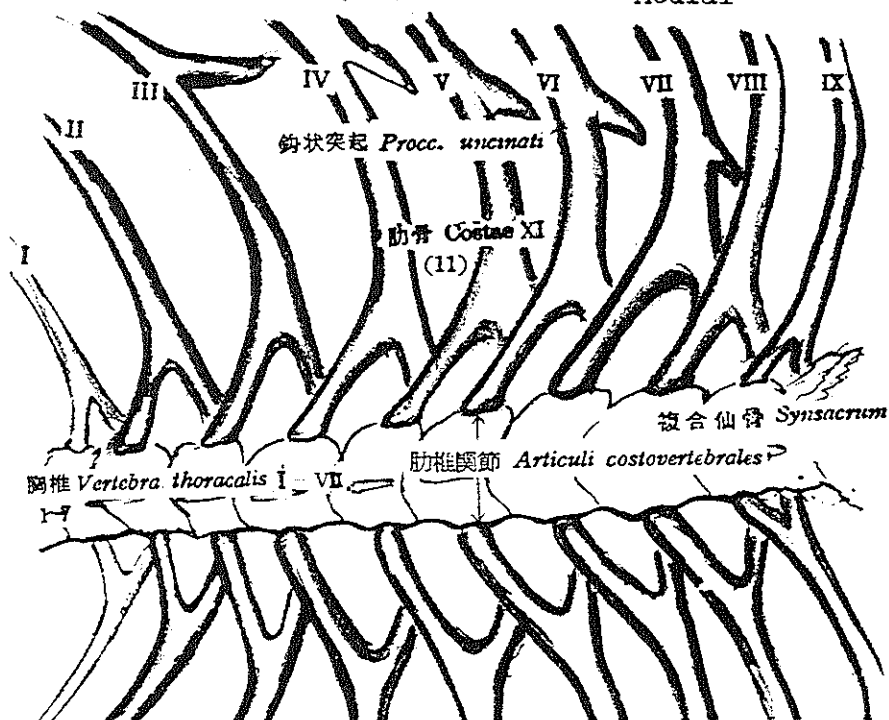
(側面) Lateral



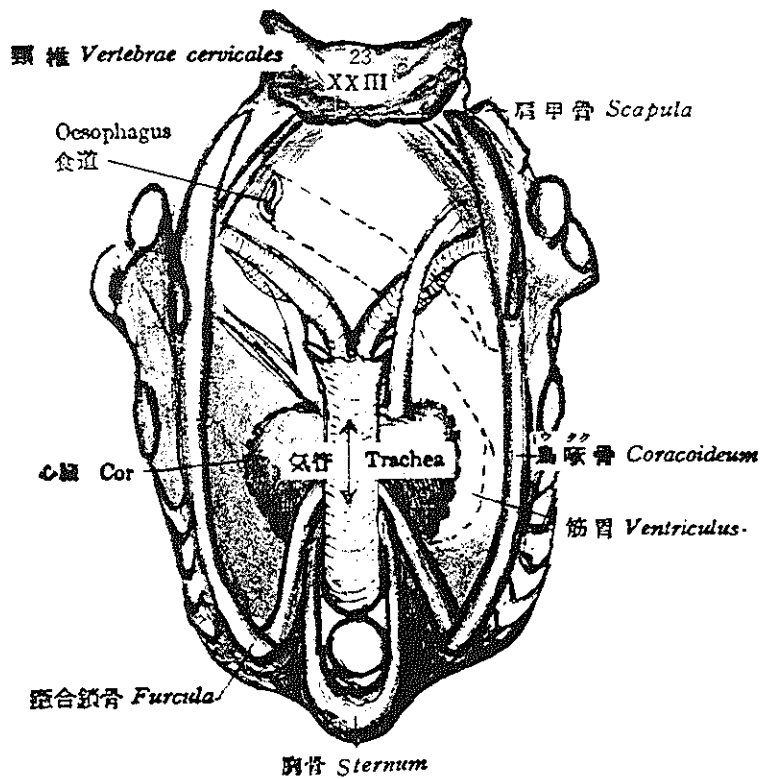
(背面) Dorsal



肋骨脊椎部 (内側) THORACIC. Medial



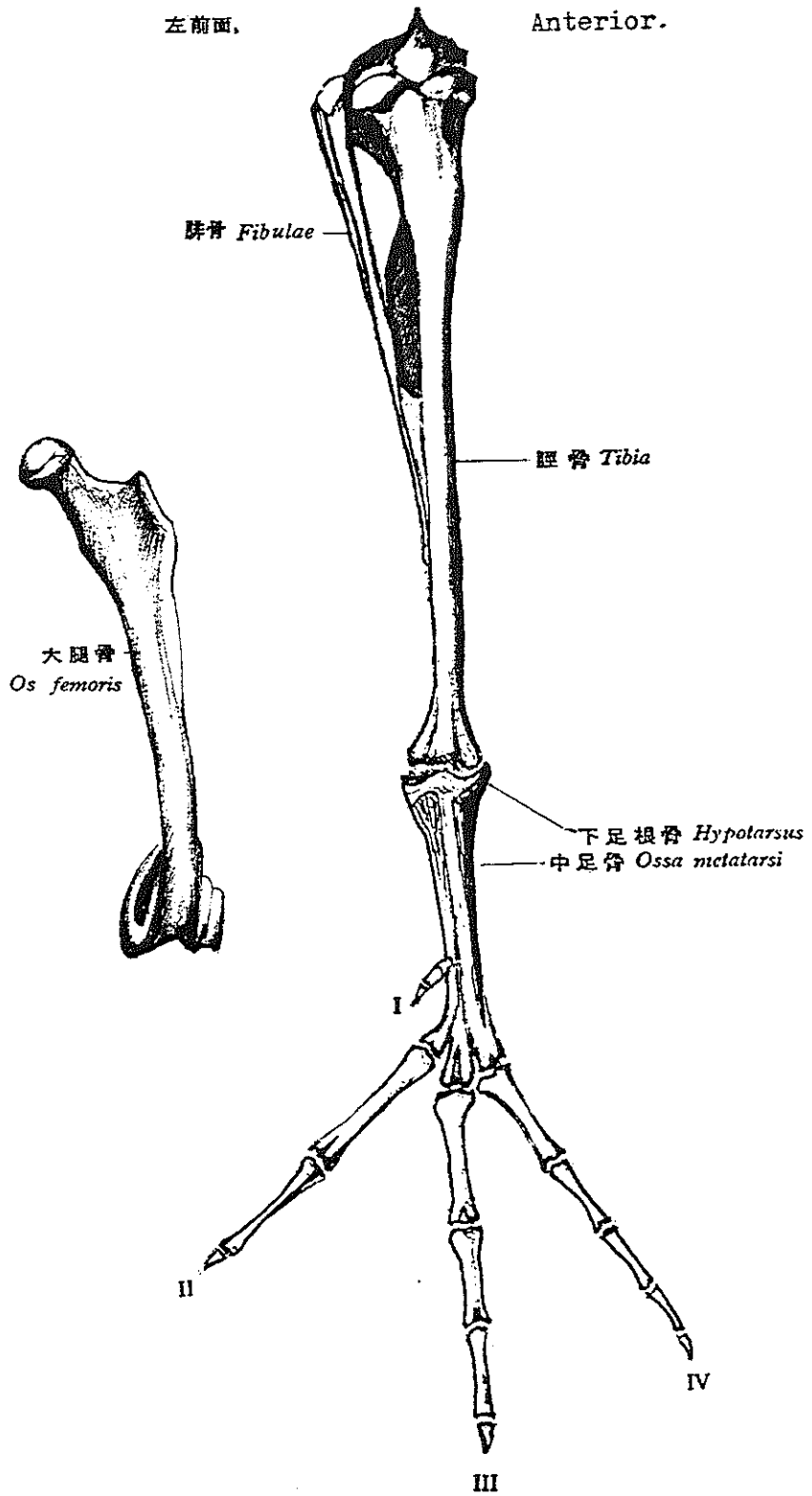
胸前部 THORACIC. Anterior.



後肢 FOOT

左前面,

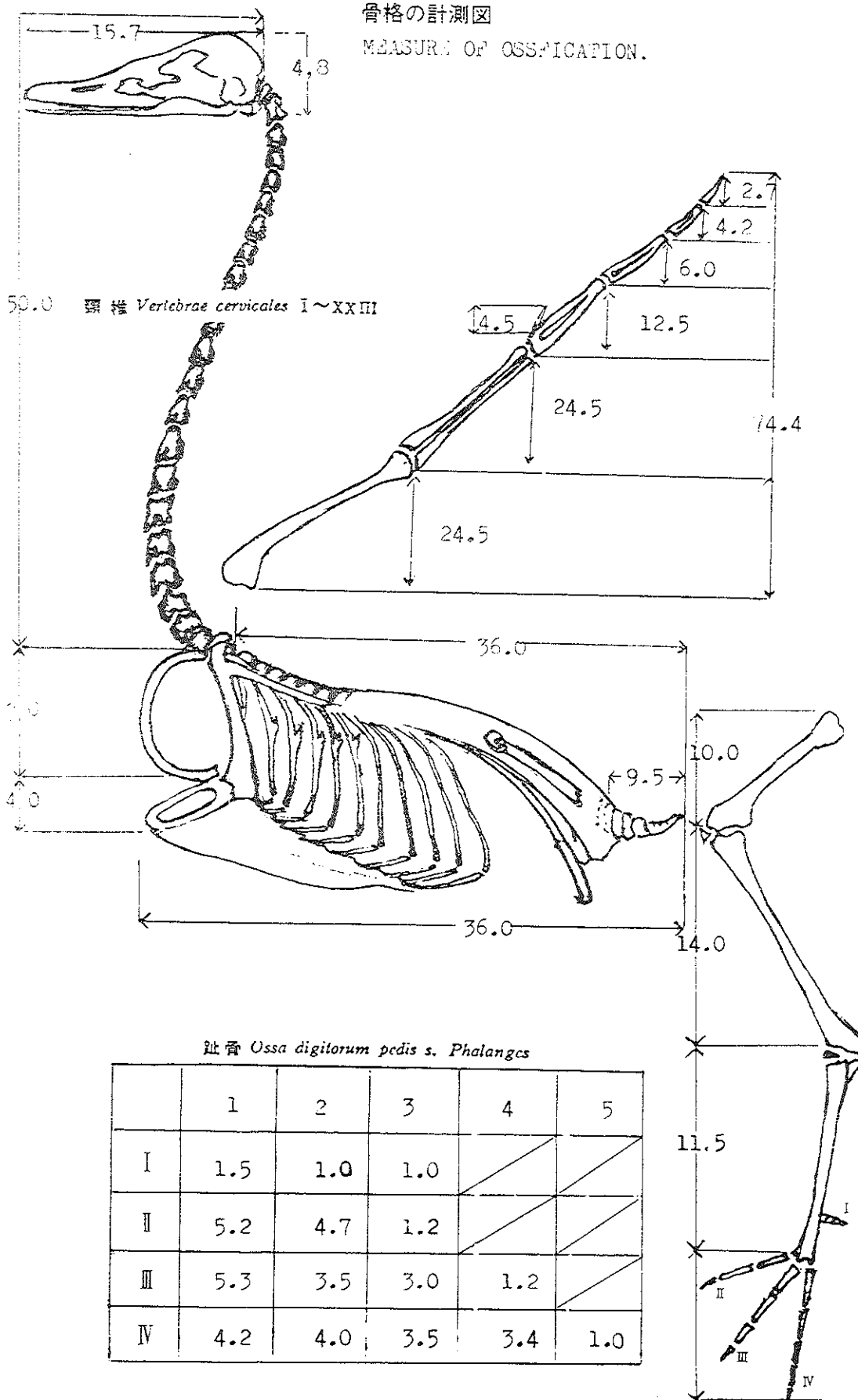
Anterior.



趾骨 Ossa digitorum pedis s. Phalanges I~IV.

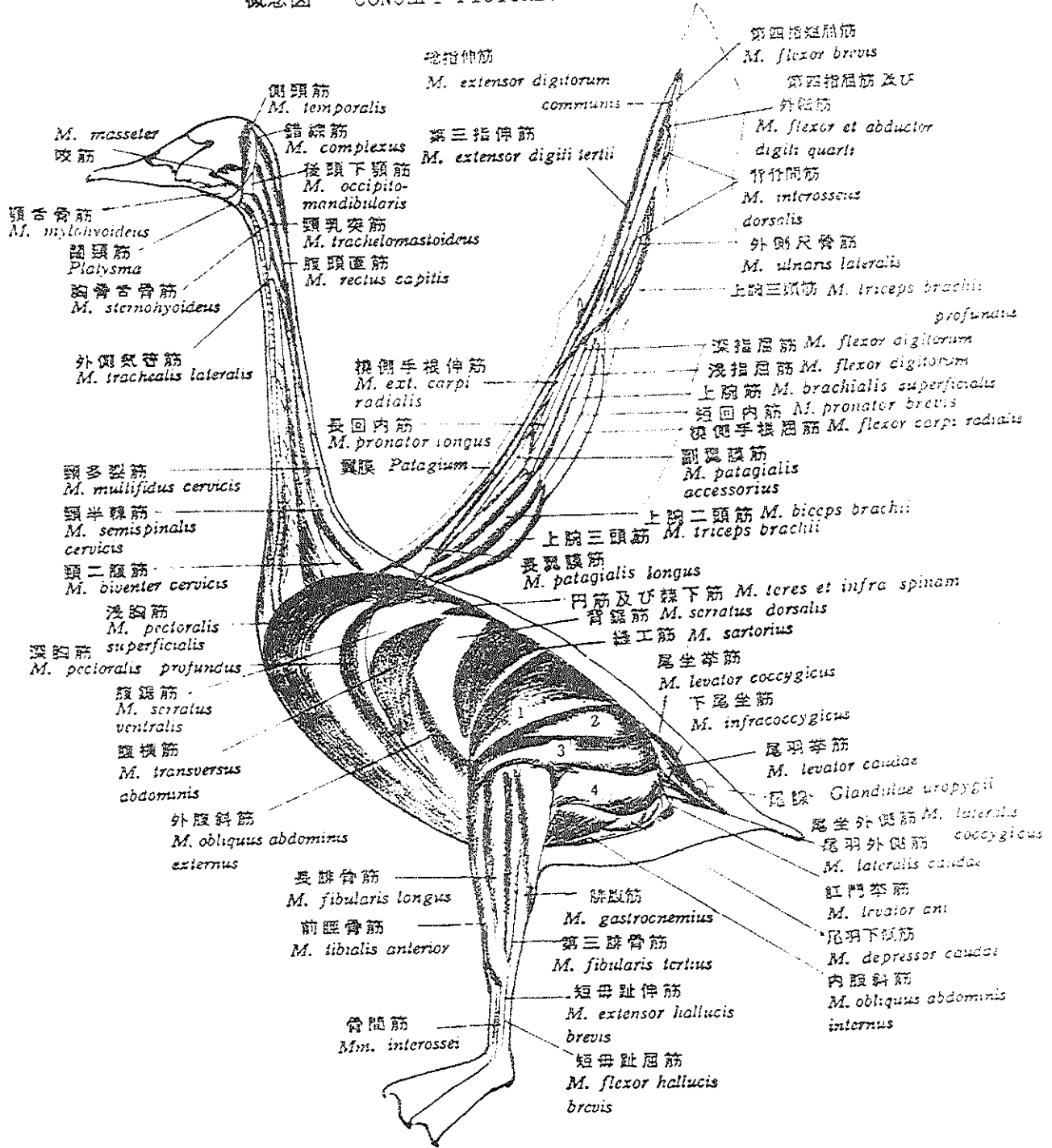
骨格の計測図

MEASURE OF OSSIFICATION.



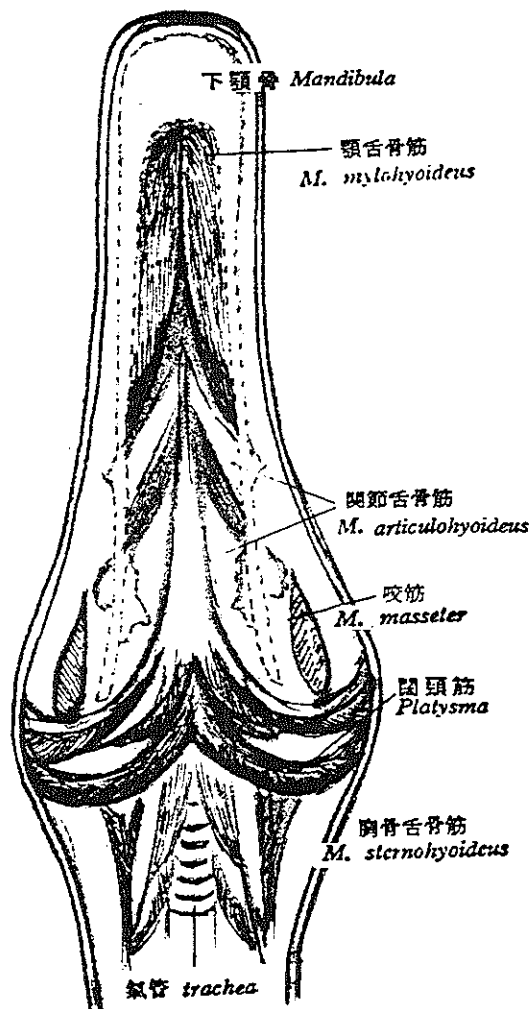
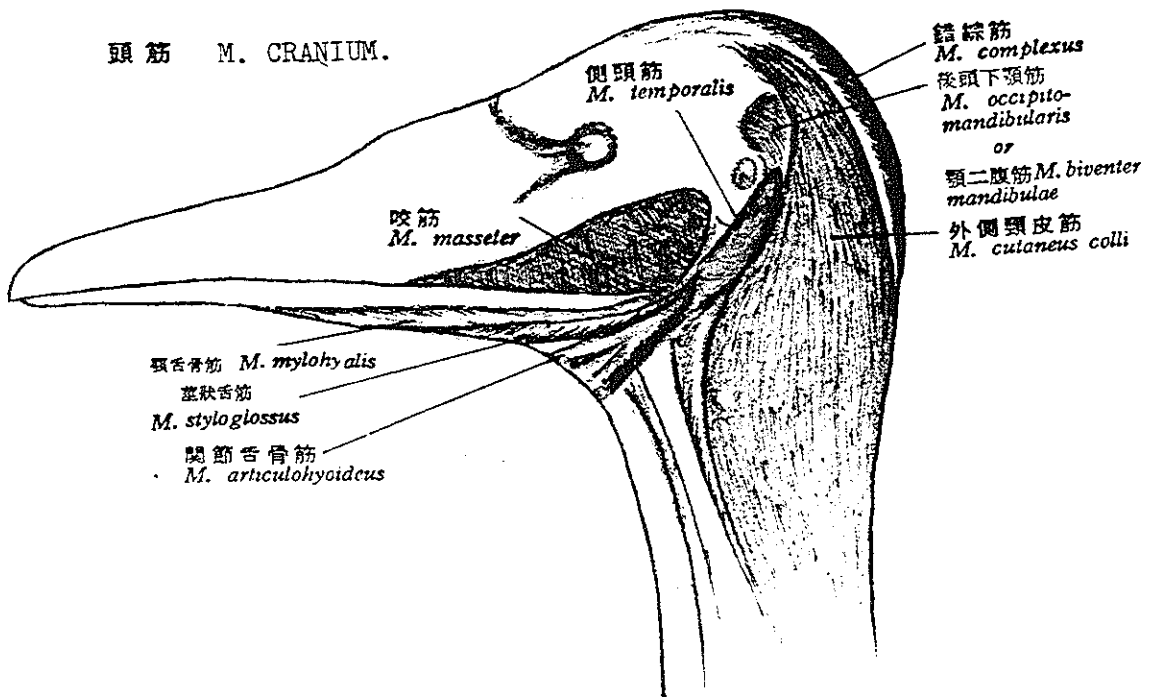
第 2 部 PART II  
 筋 肉 MUSCLE  
 (体幹表層の筋) BODY-SURFACE

概念図 CONCEPT PICTURE.



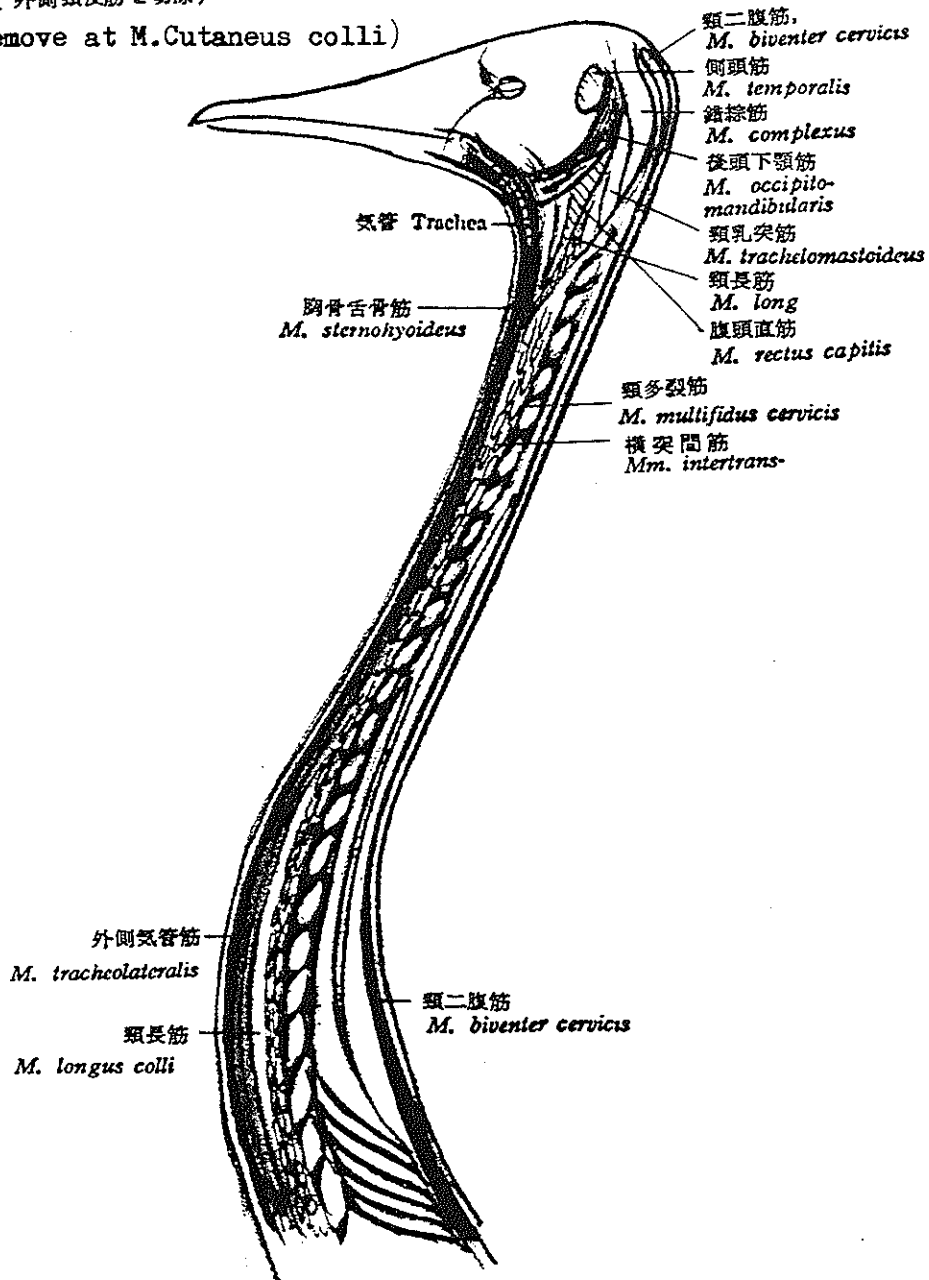
- 1. 大腿筋膜張筋 *M. tensor fasciae latae*
- 2. 半膜様筋 *M. semitendineus*
- 3. 大腿二頭筋 *M. biceps femoris*
- 4. 半膜様筋 *M. semimembraneus*

頭筋 M. CRANIUM.

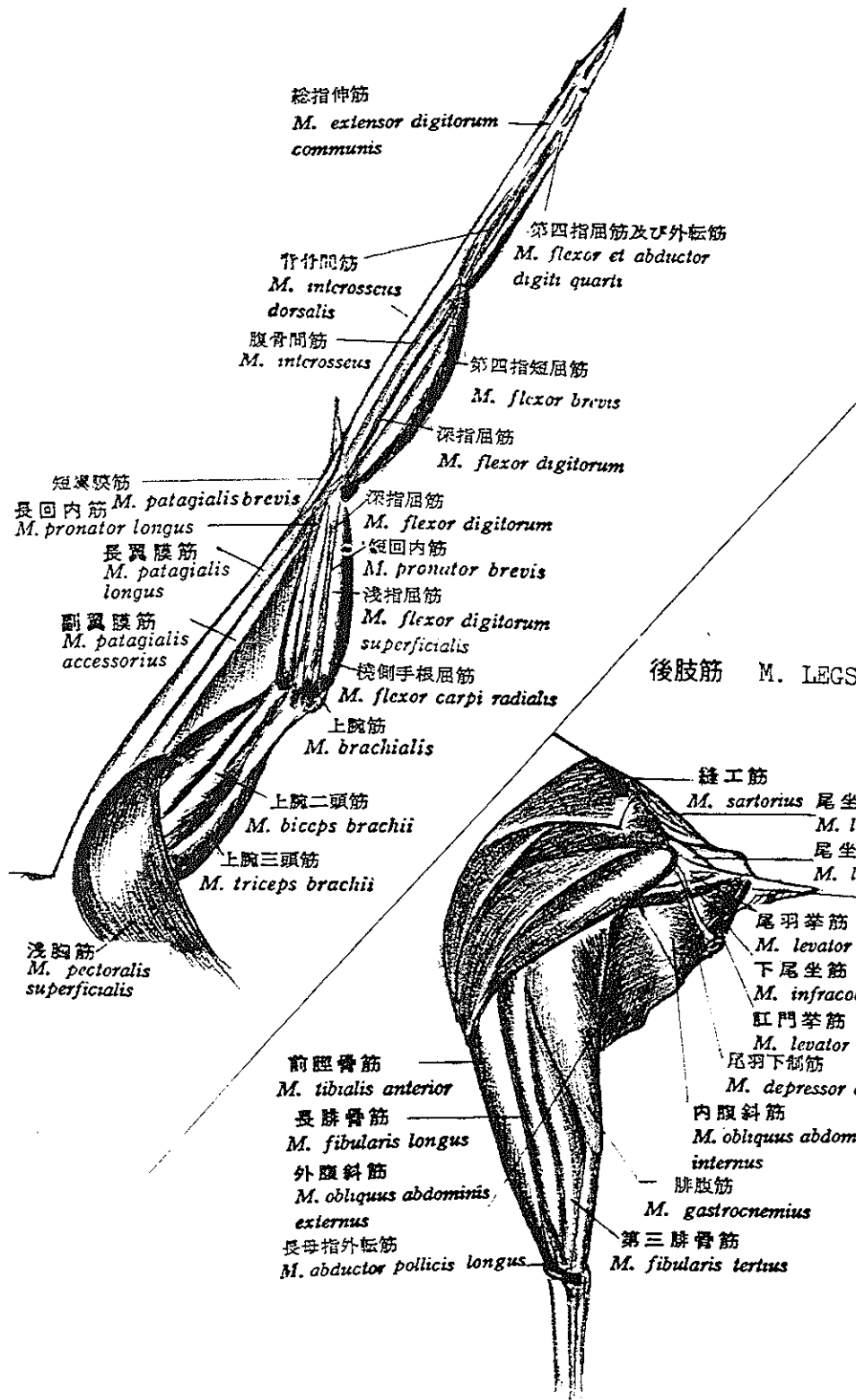


頸筋 M. CERVICAL.

(外側頸皮筋を切除)  
(Remove at M. Cutaneus colli)



前肢筋 M. FORELEGS.



総指伸筋  
*M. extensor digitorum communis*

背骨間筋  
*M. intersosseus dorsalis*

腹骨間筋  
*M. intersosseus*

短翼膜筋  
*M. patagialis brevis*

長回内筋  
*M. pronator longus*

長翼膜筋  
*M. patagialis longus*

副翼膜筋  
*M. patagialis accessorius*

深指屈筋  
*M. flexor digitorum*

短回内筋  
*M. pronator brevis*

浅指屈筋  
*M. flexor digitorum superficialis*

桡侧手根屈筋  
*M. flexor carpi radialis*

上腕筋  
*M. brachialis*

上腕二頭筋  
*M. biceps brachii*

上腕三頭筋  
*M. triceps brachii*

浅胸筋  
*M. pectoralis superficialis*

前脛骨筋  
*M. tibialis anterior*

長腓骨筋  
*M. fibularis longus*

外腹斜筋  
*M. obliquus abdominis externus*

長母指外転筋  
*M. abductor pollicis longus*

第四指屈筋及び外転筋  
*M. flexor et abductor digiti quarti*

第四指短屈筋  
*M. flexor brevis*

深指屈筋  
*M. flexor digitorum*

後肢筋 M. LEGS.

縫工筋  
*M. sartorius*

尾坐拳筋  
*M. levator coccygicus*

尾坐外側筋  
*M. lateralis coccygicus*

尾羽外側筋  
*M. lateralis caudae*

尾羽拳筋  
*M. levator caudae*

下尾坐筋  
*M. infracoccygicus*

肛門拳筋  
*M. levator ani*

尾羽下制筋  
*M. depressor caudae*

内腹斜筋  
*M. obliquus abdominis internus*

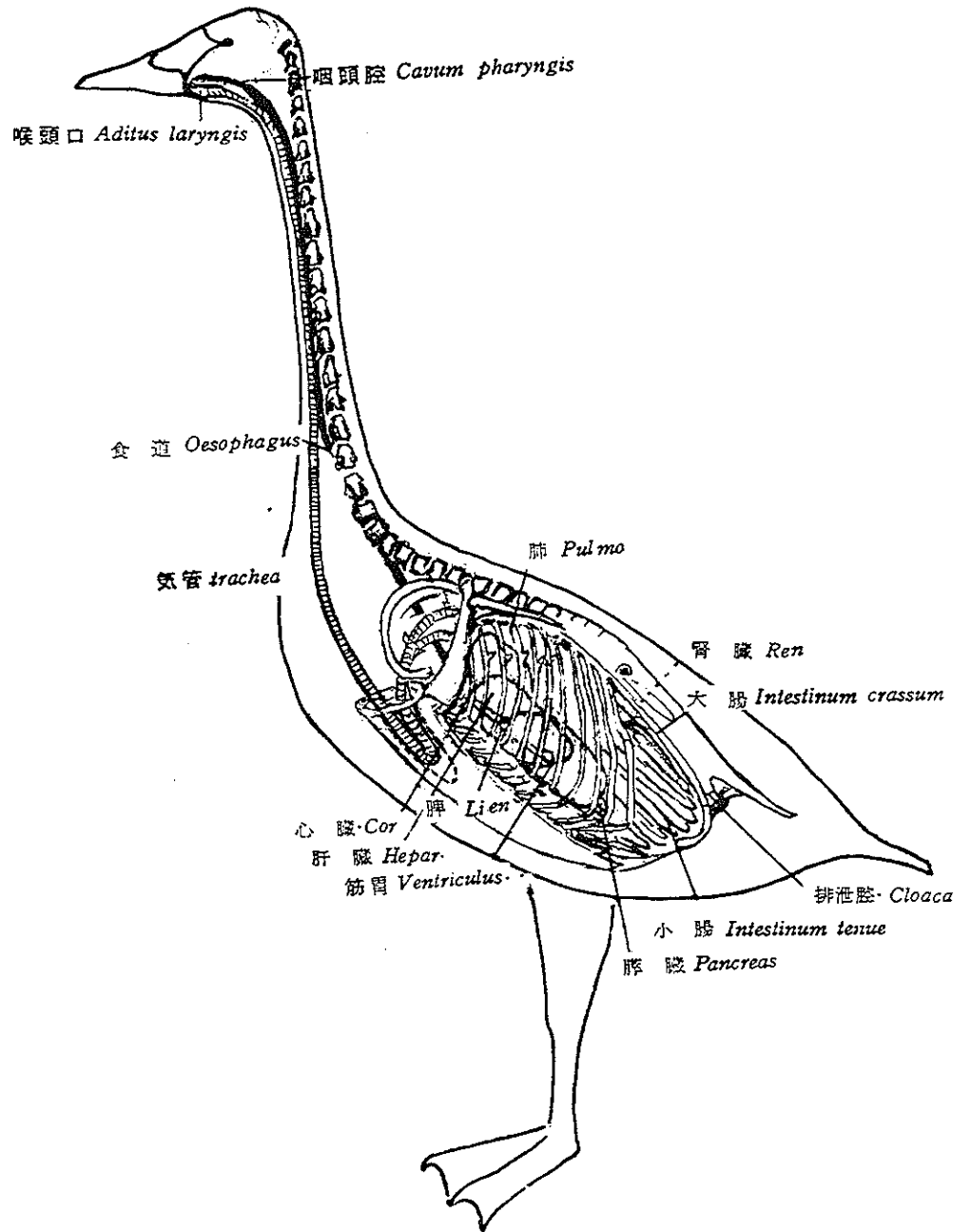
腓筋  
*M. gastrocnemius*

第三腓骨筋  
*M. fibularis tertius*

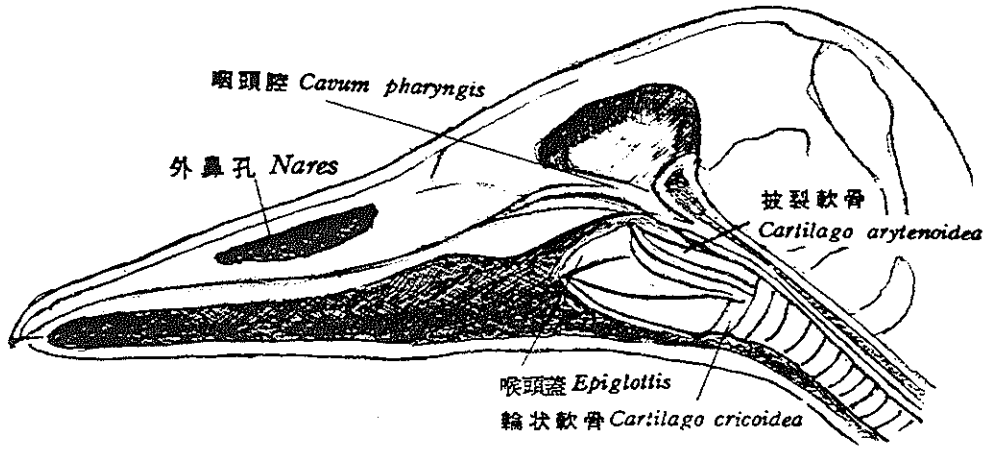


第 3 部 PART III  
臟 器 ENTRAILS

概念圖 CONCEPT PICTURE.

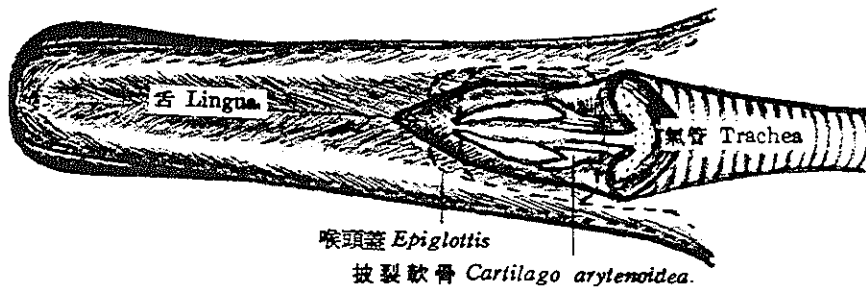


咽喉頭部 PART THROAT.



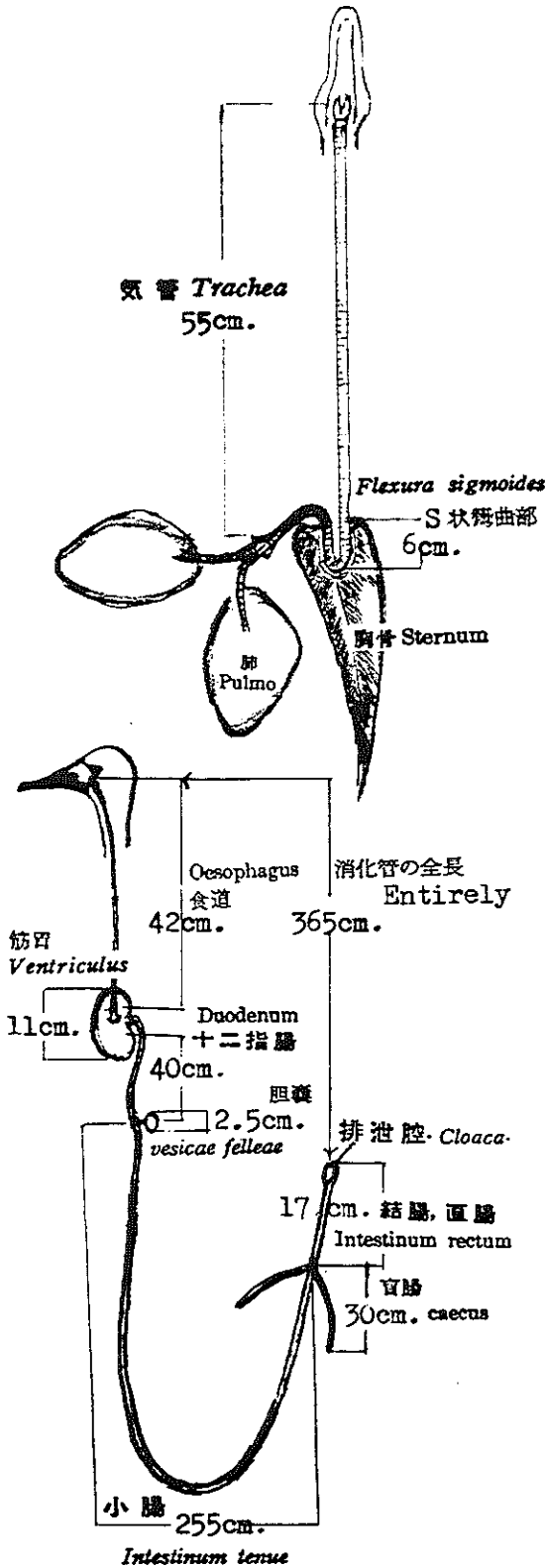
Medial

喉頭 *Larynx*



気管と消化器の長さ

SCALE OF TRACHEA AND DIGESTIVE ORGANS.



発声器官について

鼓室（鳴管）が両側気管支に連絡する正中矢状面には、カンヌキ骨（門骨）を基礎にした気管粘膜の障壁が出て気管の末端を左右に分ち、この壁の下方からおのおの弾性に富んだ内鼓状膜が出て、これに対応して対側の気管支壁からもそれぞれ外鼓状膜がせり出し、その結果、両膜の遊離縁は狭い間隙をへだて向い合う。この間隙が、機能的には、哺乳類にみる喉頭の声門裂に相当し、また鼓状膜が声帯ヒダ（声帯）に当る。

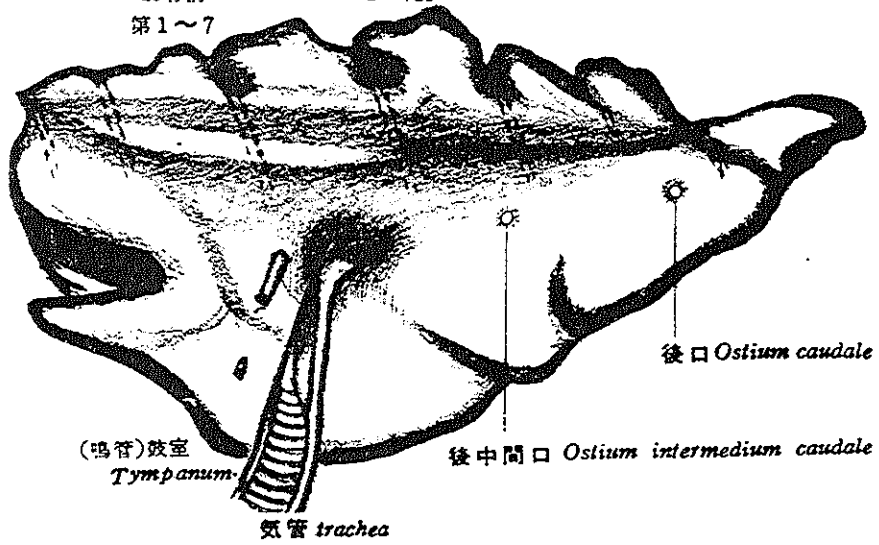
ABOUT THE VOCAL ORGANS.

In the center having an arrow-shaped aspect, to which the tympanic cavity (the syrinx) connects to the bronchi of the both sides, there is a wall of the mucous membrane of the trachea which is based on the *Pessulus* and which divides the end of the trachea into left and right, and from the lower parts of which each *Membrana tympaniformis interna* comes out, and corresponding to which *Membrana tympaniformis externa* comes out respectively from the wall of the trachea of the other side.

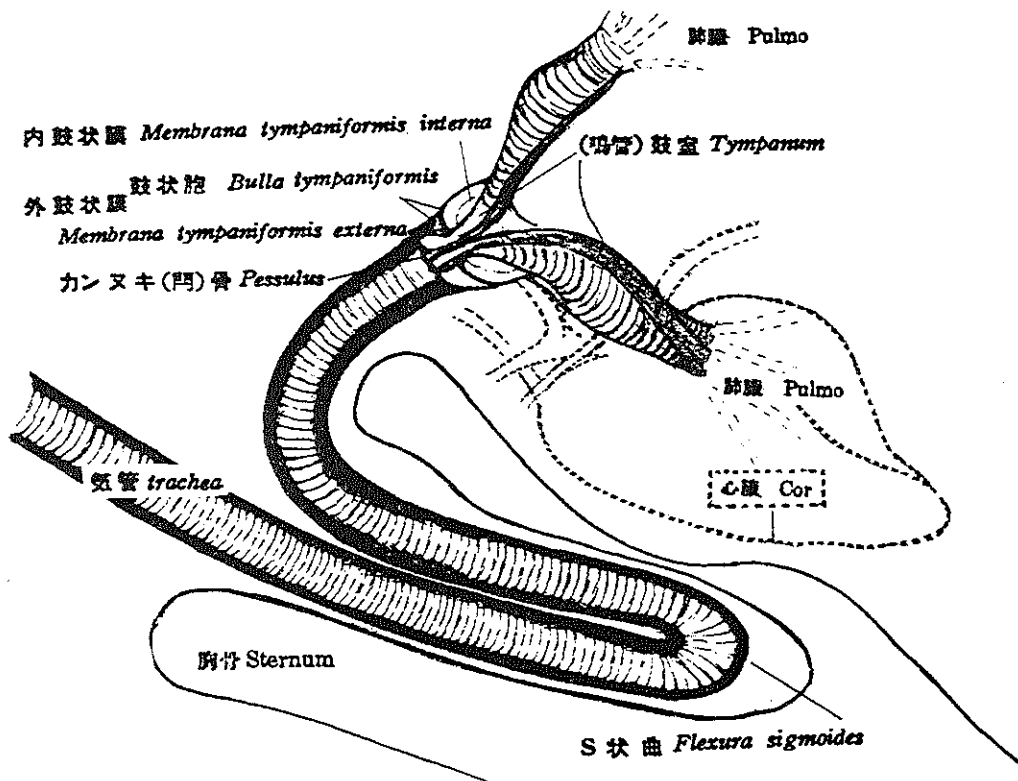
As a result, the separated edge of the both membranes sets apart a narrow space, and faces each other. This space functionally corresponds to a tear of the vocal chink ( or glottis ) of the larynx which can be seen in mammals, and also, *Bulla tympaniformis* correspondsto the fimbria of the vocal chords.

肺 LUNGS.

肋骨溝 *Sulcus costae* I~VII  
第1~7

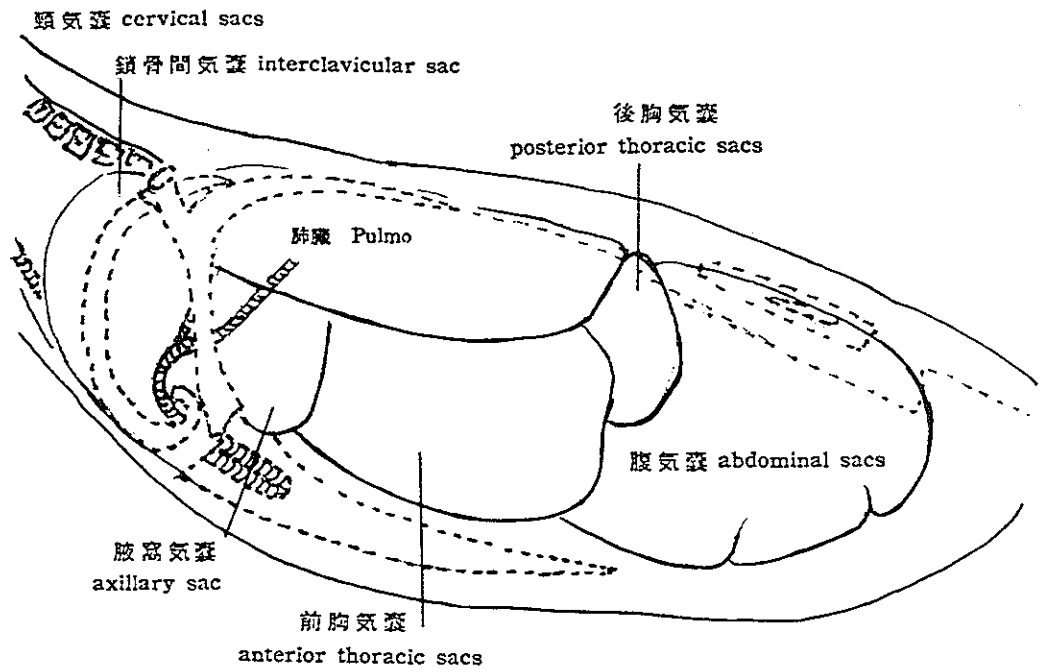


気管 BRONCHUS.

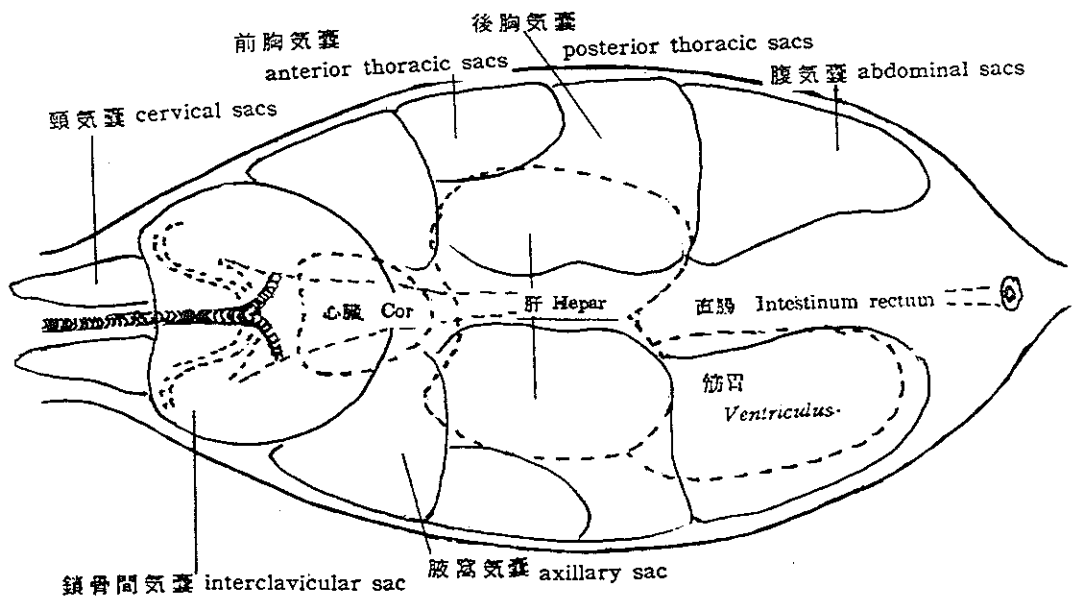


氣囊 AIR-SACS.

(側面) Lateral



(下面) Ventral



### 呼吸に際し肺および気嚢中の空気の移動状態

鳥類の肺は哺乳類の場合と違って、呼吸の際に著しく伸縮しない。その代わりに気嚢が、呼吸気の移動に作動する。

まず、呼吸の際には、気管より吸いこまれた空気は幹気管支、膜性気管支を経て、その大部分のものが直接に後胸気嚢や腹気嚢に達してこゝで貯えられる（呼吸性気嚢）。

しかし、一部の空気は膜性気管支→背気管支（二次気管支）→旁気管支（三次気管支 その連絡枝のところ

ガス交換）→膜気管支（二次気管支）→呼吸性気嚢の経路をとる。

呼吸の際には、呼吸性気嚢内の空気が膜気管支を経て幹気管支から気管に出て、外界に吐出される。また、呼吸性気嚢内に貯えられた空気の一部は呼吸の際に気嚢気管支を通じて再び肺の背気管支中に入り、呼吸の際に示した順路をたどって呼吸性気嚢内に移る。

呼吸の一部は、次の呼吸性気嚢または、背気管支に吸いこまれる。

### THE CONDITIONS OF THE AIR MOVINGS OF THE LUNG AND AIR- SACS IN THE RESPIRATION.

The lung of birds is different from that of mammals, and it does not expand and contract that much. Instead of that, their airsacs operates by the movings of the respiration.

Firstly, at the time of inspiration, the air breathed in from the trachea goes through the trunk bronchus and the membranous bronchus, and most of its air go directly to the posterior- intermediate sacs or to the abdominal sacs, and is kept in reserve there (the respiratory sacs). But some of the air breathed in take its own course to the membranous bronchus the dorsal bronchus (the second bronchus) Para bronchus (the third bronchus, the gas exchanging with the connected branch)

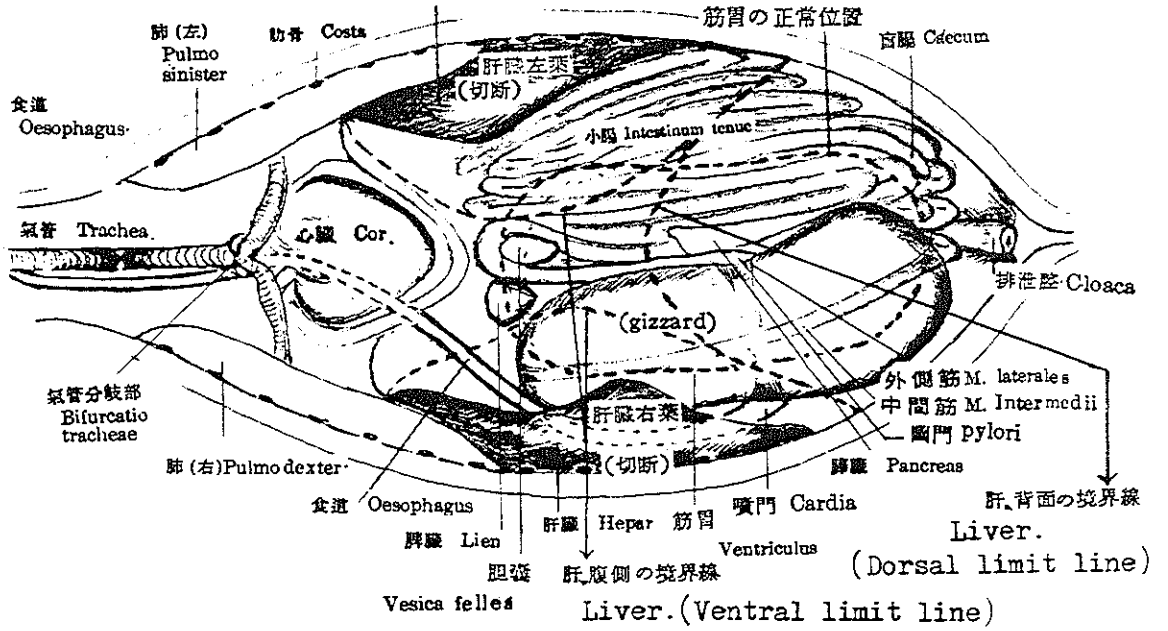
the abdominal bronchus (the second-bronchus) and then, to the respiratory sacs.

Secondly, at the time of expiration, the air being inside of the expiratory sacs goes to the trachea from the trunk bronchus by way of the abdominal bronchus, and is breathed out to the outside.

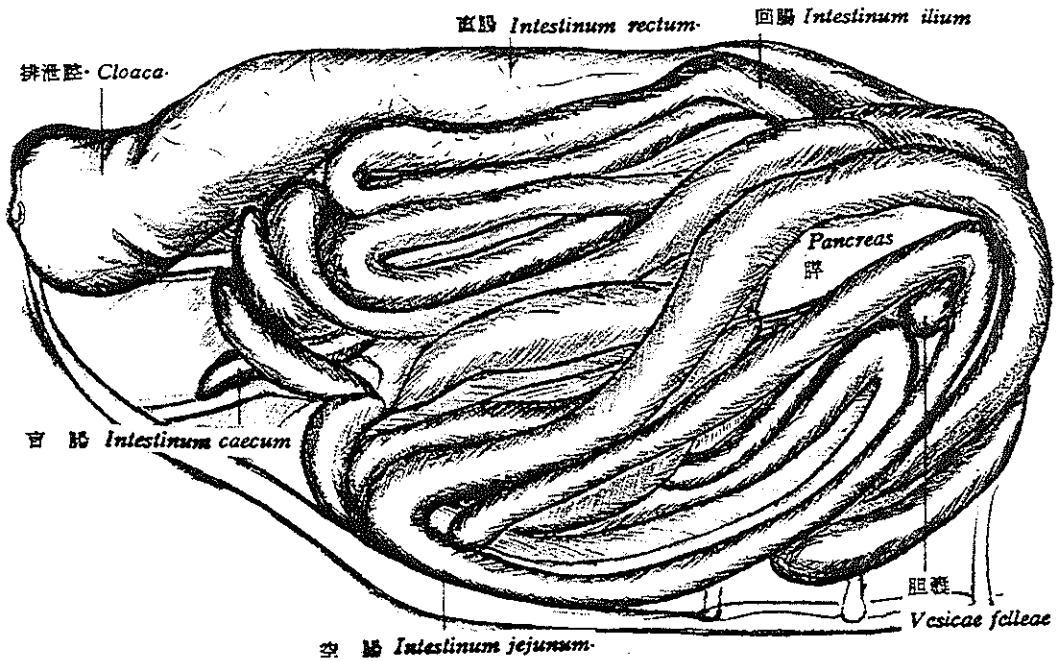
Also, some of the air reserved inside of the respiratory sacs go into the dorsal bronchus of the lung again through the airsacs bronchus at the time of expiration, and move into the expiratory sacs taking the same process showed at the time of expiration. Some of the expiration are breathed in the expiratory sacs or in the dorsal bronchus again being mixed by the air newly breathed in the expiratory sacs or in the dorsal bronchus again being mixed by the air newly breathed in when the next expiration is taken place.

主要臓器の位置 ARRANGE OF MAIN ENTRAILS. (腹側) Ventral

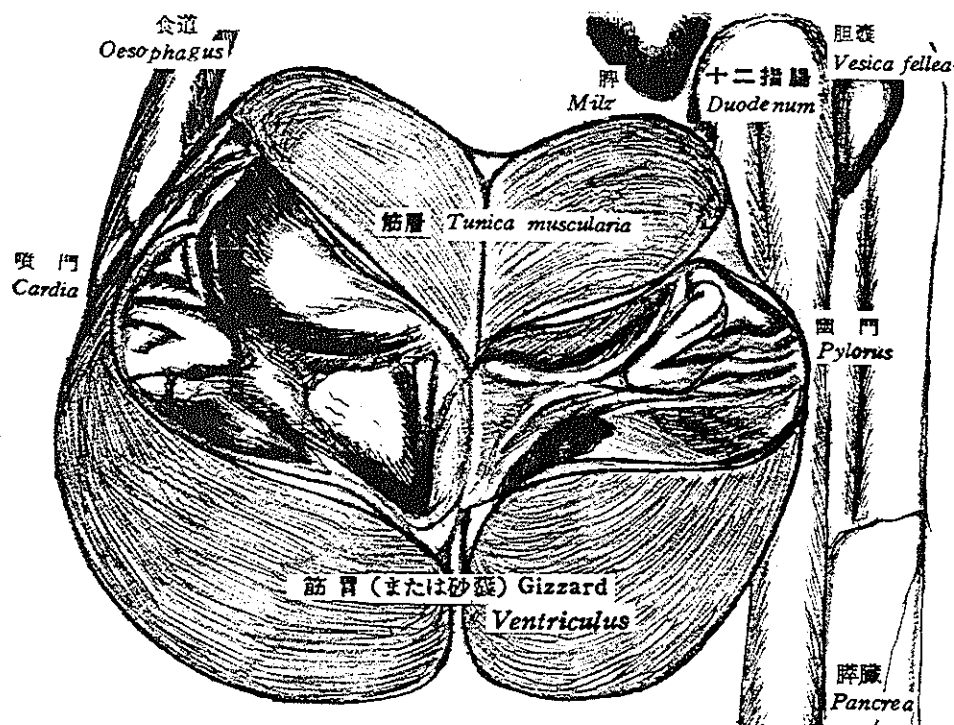
Divide of liver. Position in the rightful of Gizzard.



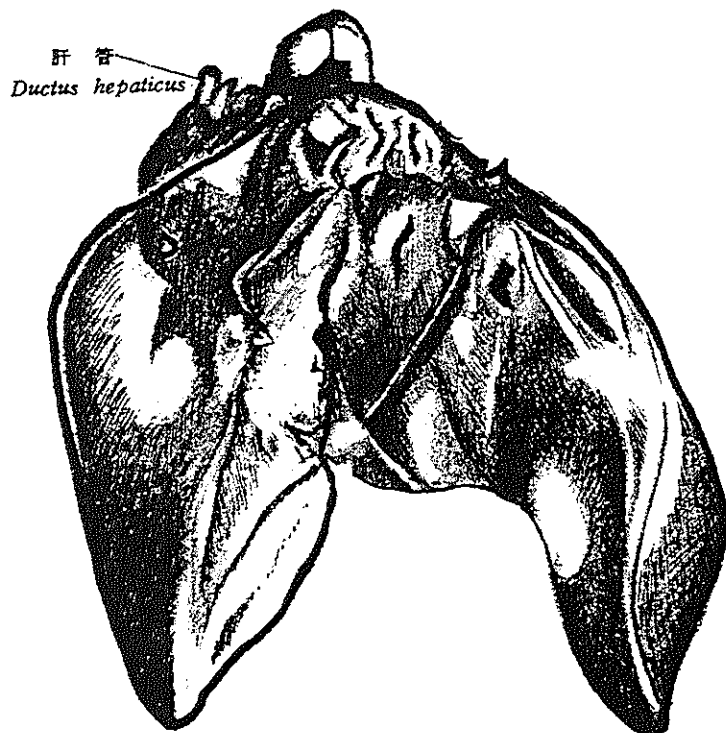
腸 INTESTINE.



筋胃の縦断図 LENGTH DIVIDE OF GIZZARD.



肝 (内側) LIVER. Medial

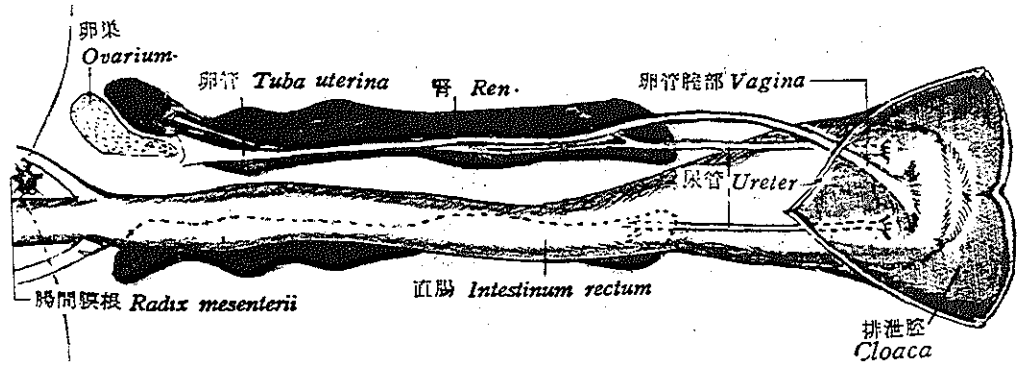




コハクチヨウの生殖器 (幼若期)

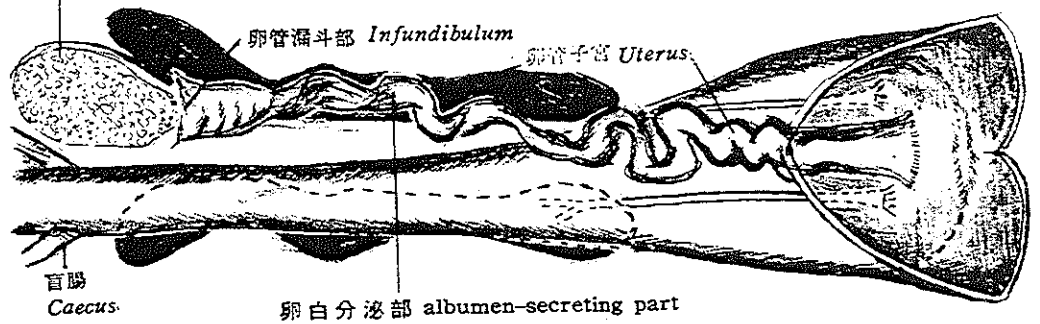
GENITALS ORGAN (Jankowski's Swan.) (Cygnet)

雌の生殖器 Genitals organ at Female.

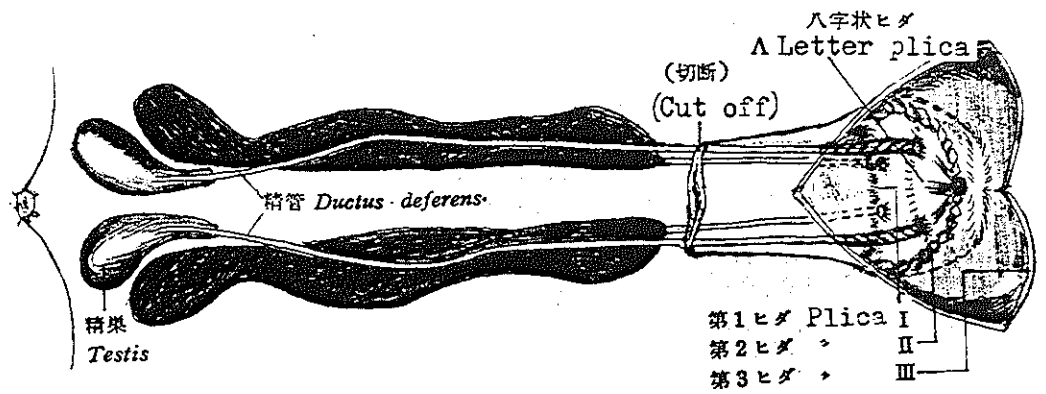


年齢 生後18ヶ月 Age. XVIII month.

卵胞 Follicule



雄の生殖器 Genitals organ at Male.



## 交尾器について

### A 雌の生殖器

卵管の子宮部後端は、左側尿道の外側で裂隙状の開口部で排泄腔に開く。排泄腔は雌の交尾器ともなる。排泄腔の腹壁のヒダは雄の場合と同じく三条の横ヒダをみられるが第二ヒダは、生殖突起、八字ヒダはなくこの部分で形態的に雌雄差を区別される。

## ABOUT THE COPULATORY ORGANS.

### A) The reproductive organs of female.

The back end of the cervical of the ovary holds the outside of the left side's urethra, and the opening parts of which open facing the cloaca. The cloaca becomes the copulatory organs of female, too. In the fimbria of the abdominal wall of the cloaca, the side fimbria which is three lines (or stripes) can be seen, and which is the same one as male's, but in the second fimbria, there is no reproductive prominence, and the fimbria of which lower parts is broad, and formally, the sexual discrimination is made by the parts just mentioned above.

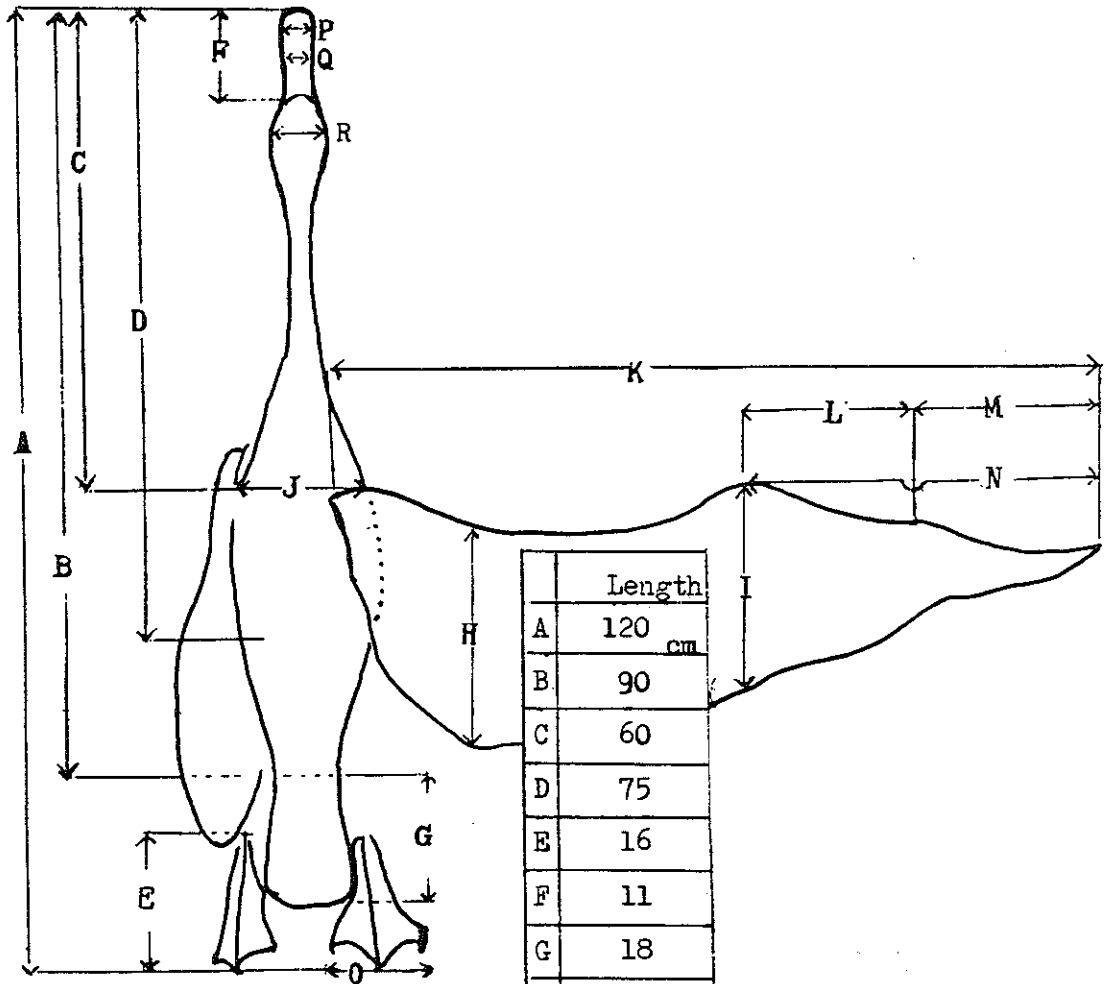
### B 雄の生殖器

鳥類全般を通じて陰茎を持つものは少ないが、ガン、カモの類ではよく発達した立派な陰茎がある。

その陰茎は発生学的にも哺乳類のものと相同器官で、平常は折りたたまれて、排泄腔腹壁のヒダに収まり、勃起の際にはリンパが導入されて、めくり上げられるように反転起立する。精管乳頭から出された精液は、陰茎を螺旋状に走る精液溝（勃起すると管になる）を通じて陰茎先端から射出される。

### B) The reproductive organs of male.

A few birds possess an intermittent penis, but among the birds, the species belonging to geese and ducks possess a well developed and imposing penis. Their is embryologically a homologous organ with that of mammals, and is usually folded up, and is put in the fimbria of the abdominal wall of the cloaca. At the time of erection, the lymph is brought into the penis, and the penis is erected reflectively as it is turned up. The semen produced from the papilla of the spermatic duct is ejaculated from the pointed head of the penis through the lacuna of the semen, which becomes the tract at the time of erection, forming the penis spirally.



	Length
A	120 cm
B	90
C	60
D	75
E	16
F	11
G	18
H	21
I	25
J	40
K	80
L	20
M	23
N	43
O	14
P	3.5
Q	3.0
R	6

第 4 部 PART IV  
羽 毛 FEATHER

羽毛の分布図 ATLAS OF FEATHER.

A 正羽 *Pennae*

主翼羽 (第 1 翼羽) primaries 初列風切

副翼羽 secondaries { 第 2 翼羽 次列風切  
第 3 翼羽 三列風切

軸羽 axial feather 小翼羽

設主翼羽 primary-coverts 大雨羽

覆翼羽 wing-coverts { 中  
小

肩羽 *Scapular*

主尾羽 main tail-feathers

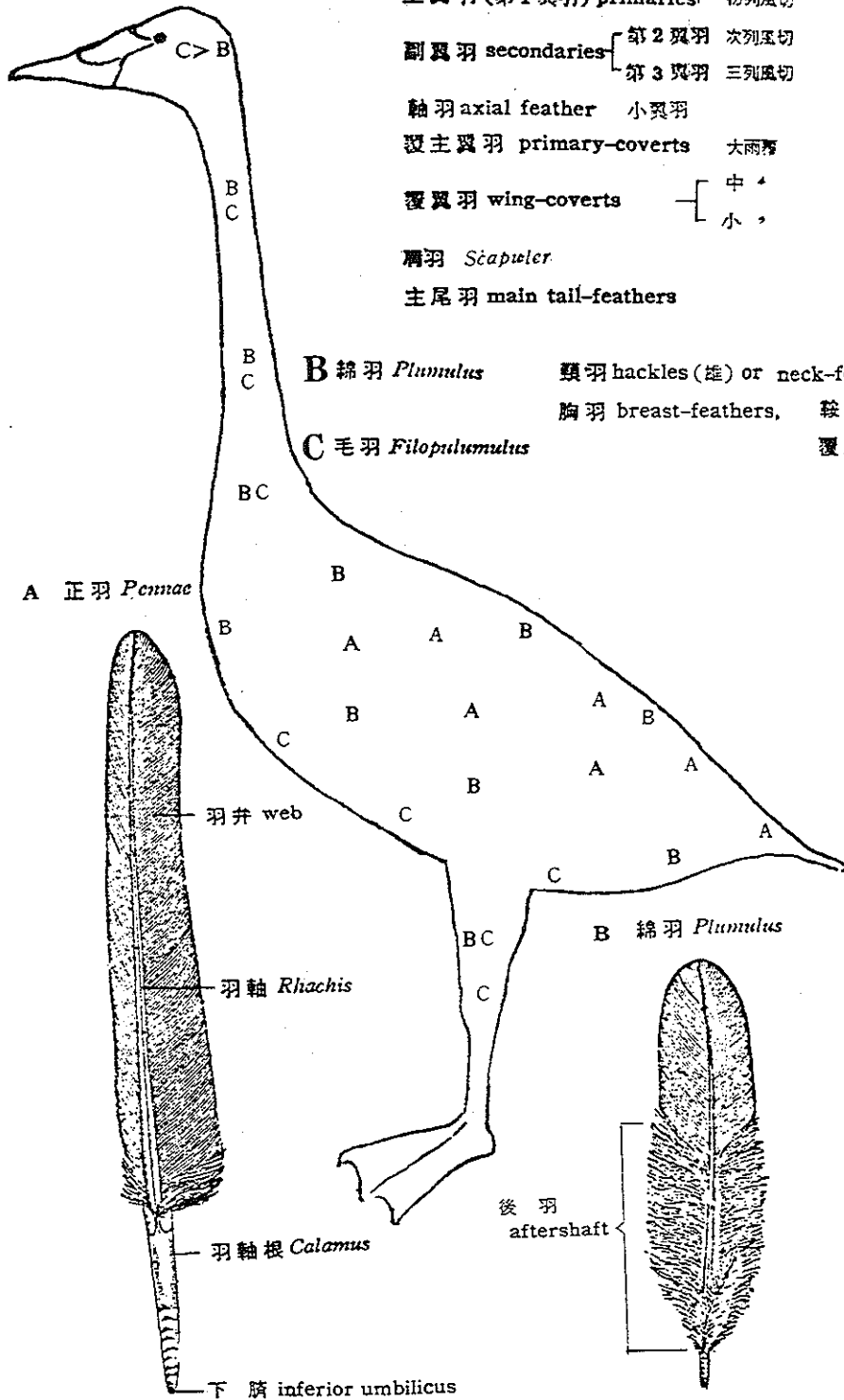
B 綿羽 *Plumulus*

頸羽 hackles (雄) or neck-feathers (雌),

胸羽 breast-feathers, 鞍羽 saddle-feathers,

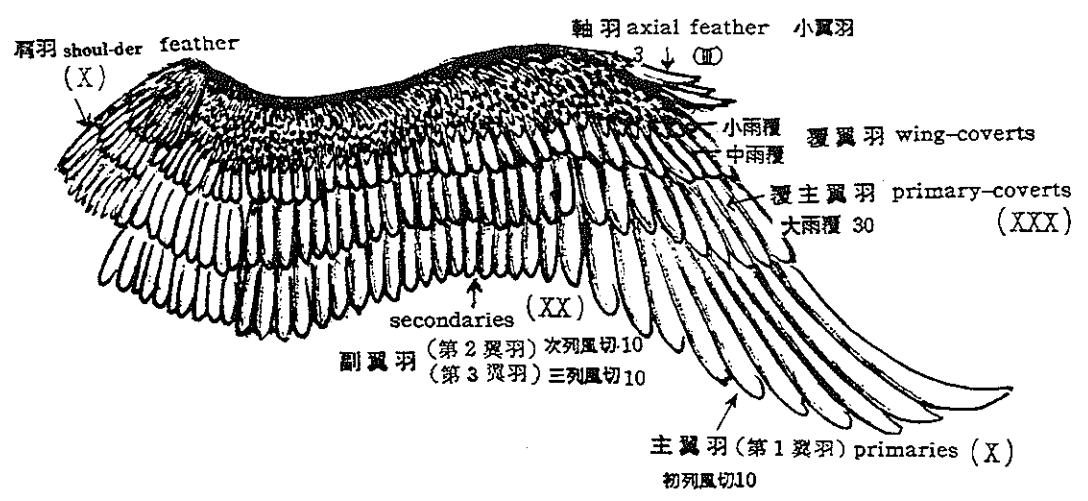
C 毛羽 *Filoplumulus*

覆尾羽 tail-coverts

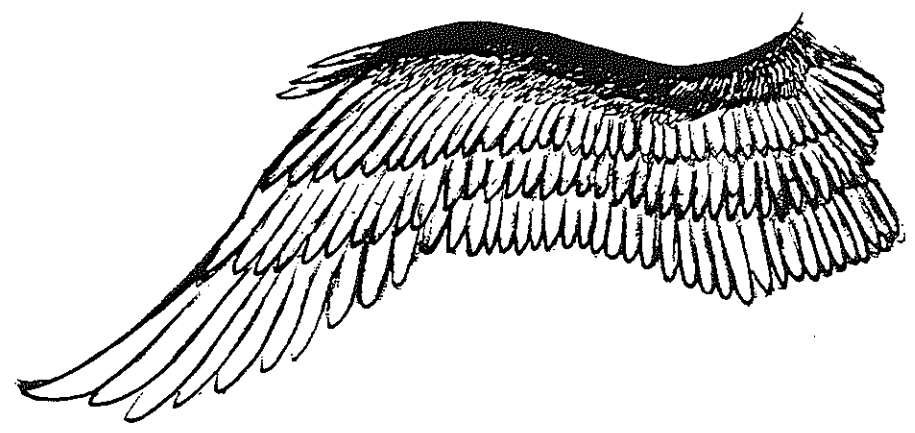


翼 WING.

表面 Surface

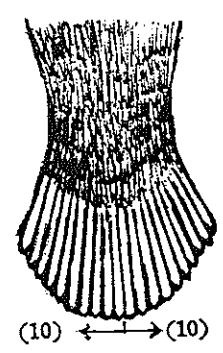
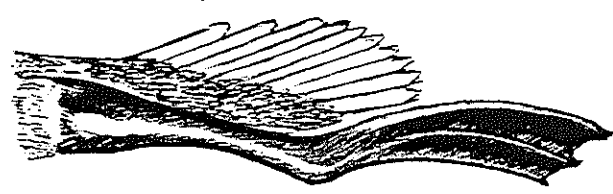


內側 Medial



主尾羽 main tail-feathers (X)

飛翔圖 Flying picture.



第5部 PART V  
雌雄の鑑別 SEEX JUDGE

雌雄の判定について

このことについては通常野外に於いて私が試みていることの概要をしるす。

1 外貌所見

雄の後頭部は稍丸味を帯び大きく、咽喉部より、頸全体に亘って稍太い。これは家族単位で遊泳しているときによくみられる。

2 嘴峰の色彩

渡来初期の嘴峰の色彩(黄色部)は、さほど相違をみられないが、飛去期(蕃殖期)が迫るにつれて、雄は微かに橙色が加わり鮮明となる。

このことは、コブハクチョウに於いて著明にみられる。

3 生殖突起法

肛門を押し開き鑑定する方法である。

これは、図(次頁)にあるように、生殖突起の形状によって鑑別する方法で、これは主に鶏の雛の鑑別に於いて用いられる技法であり、これを応用する。

- 1) 先づ体軀を仰臥に保定し、宿尿を除去する。
- 2) 右手掌を尾根部より前方におく。
- 3) 食指を肛門後部に、拇指を前方にあてる。
- 4) 瞬間的に肛門を開くと同時に、搾り出すように、両指の間隔を狭めるように押し下げる。右手掌は之を介助するように押し上げる。

これを反復することは望ましくない。生殖突起の怒脹が鈍くなる。

4 排泄腔内触知法(内診)

食指を肛門より挿入する。

- a) 雄、緊縛感があり深部挿入に抵抗がある。これは雄の生殖突起があるからである。
- b) 雌、比較的容易に指を深く挿入できる。

ABOUT THE DISCRIMINATION  
BETWEEN FEMALE AND MALE.

I hereinafter want to give some outlines in respect of the discrimination between female and male that I am usually studying outdoors.

1) Appearances

The back parts of the head of male are rather roundish and large than those of female, and the parts from the larynx down to the neck of male are rather roundish than those of female. This can be well seen when they are swimming by their family.

2) The color of the culmen

The color of the culmen, the parts of which are yellow, at the beginning of their arrival is not so different from each other, but with approaching the time of their leaving (a bleeding season) from a place where they have been staying, the color of the culmen of male gets orange slightly and becomes clear. This can be clearly seen in respect of a mute swan.

3) A method of the reproductive prominence.

This is a method for discriminating by pushing and opening the anal.

As there is in Figure 1, this is the method for discriminating by the forms of the reproductive prominence, and is a technique for mainly being used in the discrimination between female and male of chicken, and if this method is used, it goes like this;

- 1 - Firstly, the body of a chicken is turned up, and the feces contained long in the intestines is gotten rid of.
- 2 - Secondly, the palm of the right hand is put forward than the parts of the tail end.
- 3 - Thirdly, the index finger is put at the back parts of the anal region, and the thumb is put forward.
- 4 - Fourthly, at the same time of opening the anal, instantly, as the fingers are pressed out, the space of the index finger and the thumb is pushed down narrowing the space. The palm of the right hand is pushed up in order to help the action of the index finger and the thumb. However, it is not desirable to repeat this action over and over, because the overswelling of the reproductive prominence gets dull.

4) A method of touching the inside of the cloaca (Internal examination)

The index finger is inserted from the anal.

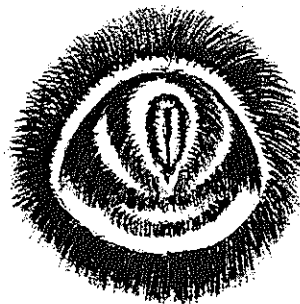
a) - In the case of male, some sense of tight blinding and resistance in inserting to the deep parts is felt.

This is just because male has the reproductive prominence.

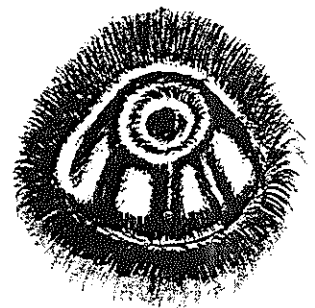
b) - In the case of female, it is comperably easier to insert a finger into the anal deeply.

☒ Figure

Female



Male



参 考 文 献

加藤嘉太郎著 家畜解剖図説 1968

References

Yoshitaro Kato. Explanatory diagram for livestock anatomy.  
1968.

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