DANISH REVIEW OF GAME BIOLOGY Vol. 8 no. 1

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Ib Clausager

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Introduction

In connection with studies on the occurrence and shooting exploitation of the woodcock *(Scolopax rusticola)* in Denmark (CLAUSAGER 1972), investigations have been carried out with the aim of discovering external characters from which age and sex may be determined. The present paper describes the results which have been achieved to date.

Several workers in the past have tried without result to find criteria for the age and sex determination of the woodcock. For instance, the colour pattern of the outermost large primary (number 10 from inside) has several times been used as an age criterion. According to GARAVANI (1965), if the outer vane of this feather is evenly spotted throughout its length, then it originates from a bird in its first year of life. If there are only a few spots, then the feather is from an individual in its second year, and if the spots are replaced by a long unbroken whitish margin, the feather is from a bird of three years' age or more. Similar characters were reported by ARNHEM (1968). Evaluation of these criteria, partly carried out at Eley Game Advisory Station (Annual Review 1968/69) and partly in connection with the present work, showed that age determination on these criteria was not reliable enough.

The differences mentioned above in the colour patterns of the 10th primary have also been utilized as a sexual character, regularly spotted feathers originating from males, and feathers with a whitish unbroken stripe originating from females (Oberländer's method), BETTMANN (1961). The present investigations show that this criterion is not suitable for sex determination.

For the American woodcock *(Philohela minor)* SHELDON et al. (1958) report a method for age determination based on the degree of wear on the primaries. Preliminary studies showed that this method could very probably be applied to the European woodcock, and therefore some individuals were obtained for closer investigation.

The bird skin collection in the Zoological Museum of Copenhagen was examined in connection with these studies, permission being granted by Dr. F. SALOMONSEN. Curator V. MARCSTRÖM of the Zoofysiologiska Institutionen, Uppsala, Sweden, is to be thanked for permission to examine the wings of woodcock shot in breeding localities in Sweden during the months of May, June and July.

Age determination

The material used to investigate external characters for age determination originates from the period September–January, as young individuals from this period can be accurately determined as to age on the basis of the presence of the bursa fabricii, which adult birds lack. In the case of females, age can also be determined from the appearance of the oviduct, which in young females is straight, but in older females which have bred it is wide and sinuous. The museum skins of females of the woodcock which were examined were all age determined on the basis of the appearance of the oviduct. None of the males in the collection of skins were age

Period *Periode*	Collected by the Game Biology Station *Indsamlet af Vildtbiologisk Station*				Skin specimens from Zoological Museum *Skind fra Zoologisk Museum*	
	♂ ad	♀ ad	♂ juv	♀ juv	♀ ad	♀ juv
Sep. 21 – 30			1			
Oct. 1 – 10			3	7	2	2
11 – 20				1		3
21 – 31		1		4	4	4
Nov. 1 – 10	11	10	13	9	2	5
11 – 20	5	3		1	3	4
21 – 30	6	2	6	3		1
Dec. 1 – 10		4	3	4		1
11 – 20		1	2			
21 – 31						
Jan. 1 – 10			1			1
11 – 20	1			1		
21 – 31						
Feb. 1 – 10						2
Total	23	21	29	30	11	23

Table 1. The origin in time of 137 woodcock examined.

Tabel 1. Tidsmæssig fordeling af 137 undersøgte skovsnepper.

determined, and these have been omitted from the material.

The distribution of the 137 woodcock used in the age determination studies is shown in Table 1. The sex determination was based on the presence of testes or ovaries.

BURSA FABRICII

In the autumn months, young birds have a very clear and distinct bursa fabricii, the depth of which varies between 4 and 33 mm. The depth of the bursa of the majority of birds examined was between 10 and 30 mm.

The opening of the bursa is normally about 10 mm. wide, but in a few individuals from December and January the opening had narrowed to 2–3 mm., although it was still deep. In one young female, age determined on the basis of the wear on the primaries (see p. 6), the bursa was no longer present, but the oviduct was straight. This individual was from January 20th.

Arrangement of the young birds according to age illustrates that the depth of the bursa decreases during the autumn and winter (Table 2). As the material examined only comprises a few individuals from January and February, the age at which the bursa disappears cannot be

Month *Måned*	Average depth of bursa *Gens. bursa-dybde*	Number measured *Antal målte*
October	21.3 mm	18
November	19.9 mm	28
December	12.3 mm	5
January	(5) mm	2

Table 2. Average depth of the bursa fabricii of young woodcock.

Tabel 2. Gennemsnitlig bursadybde hos unge skovsnepper.

determined exactly. However, 81 individuals from March and April no longer possess a bursa, which implies that it must disappear in January–February, before sexual maturity is reached.

In the adult woodcock a loose fold of skin occurs at the site of the bursa, and it does not form a pocket.

In examining the bursa of the woodcock it is necessary to cut open the cloaca, and the method can thus only be used with dead birds.

PRIMARY MOULT

WITHERBY et al. (1943) report that adult woodcock have one complete moult during the period July–December. In addition there is also a partial moult including body feathers and coverts but not the primaries, during the period of February–May.

The material examined from Denmark does not comprise animals from the summer (May–September), and thus the sequence of moulting of the primaries could not be determined. However, wings of 30 woodcock from Sweden, shot as adults in their breeding areas during the period 21st April–31st July, were available for examination (Table 3). In addition, 75 wings from adult woodcock similarly shot in their breeding area during the period 15th May–15th July were also available. Although dates of shooting for these 75 birds were not specified exactly, the majority were from the first half of the period, that is to say until 15th June. No moulting of the primaries was observed in any of the 75 wings examined.

The investigations indicate that moulting of the primaries may begin as early as late June, but it is presumed in the majority of birds to begin in the latter half of July. All the adult woodcock mentioned in Table 1 had completed the moult of the primary feathers, and were thus of no use in determining the completion of the moult. During the autumn shooting season (24th September–31st December) in 1969, 1970 and 1971 the three outermost large primaries (8th, 9th and 10th) were collected from approximately 600 adult birds. Only 3 had not fully completed the moult of these feathers. On this evidence, it can be concluded that the primary moult is generally completed by the end of September, but that in a few individuals it may last until the middle of October, and exceptionally until the middle of November.

STRESEMANN (1966) reports that in young individuals of »nicht weit wandernden Charadriiden und Scolopaciden«, there is no moulting of the primaries until after the first breeding season, that is

Period *Periode*	No. of wings examined *Antal undersøgte vinger*	No. in which primary moulting had begun *Antal, hvor fældning af svingfjer er begyndt*
April 21 – 30	1	0
May 11 – 20	3	0
21 – 31	3	0
June 11 – 20	1	0
21 – 30	9	1
July 1 – 10	7	1
11 – 20	3	1
21 – 31	2	2
Aug. 11 – 20	1	1
Total	30	6

Table 3. The distribution in time of wings from woodcock shot in Sweden.

Tabel 3. Tidsmæssig fordeling af vinger fra nedlagte svenske skovsnepper.

to say, until after 12 months of age. For »first winter« individuals of the woodcock, Witherby et al. (1943) mention: »As adult and not to be distinguished with certainty; remiges and some wing coverts usually appear more worn. The juvenile body feathers, tail, innermost secondaries and coverts, apparently all or most greater, median and lesser coverts are moulted in autumn but not rest of the wings«. Thus, similarly to Stresemann, Witherby et al. state that young birds do not moult their primaries during their first year.

PRIMARY WEAR

Due to differences in the sequence of moulting of young and adult birds, the degree of wear on the primaries is different in each age group. In individuals from the autumn period (October–December), the primaries of the adults have only been exposed to wear for a short time (1–3 months), while in the great majority of young birds these feathers have been exposed to wear over a rather longer period (3–7 months).

Last primary, on which wear is recognizable *Sidste håndsvingfjer, hvor slitage kan erkendes*	Autumn No. of individuals % *Efterår Antal individer* %		Spring No. of individuals % *Forår Antal individer* %	
1	0	–	3	1.0
2	2	0,5	0	–
3	4	0,9	2	0.7
4	23	5.4	19	6.6
5	70	16.5	81	28.3
6	118	27.8	111	38.7
7	110	26.0	52	18.1
8	84	19.8	10	3.5
9	7	1.7	6	2.1
10	2	0.5	3	1.0
No wear	4	0.9	0	–
Total	424	100.0	287	100.0

Table 4. The last (innermost) primary in juvenile woodcock, on which wear could be determined. Feathers are numbered descendantly.

Tabel 4. Sidste håndsvingfjer hos juvenile skovsnepper, hvor slitage kan konstateres. Nummerering af fjerene er regnet indefra.

Sheldon et al. (1958) state that wear on the primaries of the American woodcock occurs in a different way in adult and juvenile individuals. This was also found to be the case in the European woodcock; the barbs and barbules of the primaries are apparently more robust in adult birds than in young ones, and are thus not so easily broken. As a result, in adult birds the barbs and barbules wear at the same rate, and the feathers continue to appear with complete, unbroken edges. However, in young birds, the barbs break off in pieces of varying length as a result of wear, and the edges of the feather present a frayed appearance, which in most cases can immediately be distinguished (Fig. 1).

The wear is always greatest on the outermost primaries (8th, 9th and 10th), and it decreases inwards. It is especially concentrated at the tip of the feather and the outer part of the inner vane, while the outer vane is worn to a lesser degree. The indentations caused by wear may be up to a couple of millimetres deep (Fig. 1).

The degree of wear varies from one individual to another, but usually the feathers are so worn that the indentations are clearly evident. In a few young birds, probably those from late clutches, there is almost no wear evident, and it is difficult to determine their age from the appearance of the primary feathers alone. However, such examples have always possessed juvenile tail feathers, which reveal that the bird in question is a young

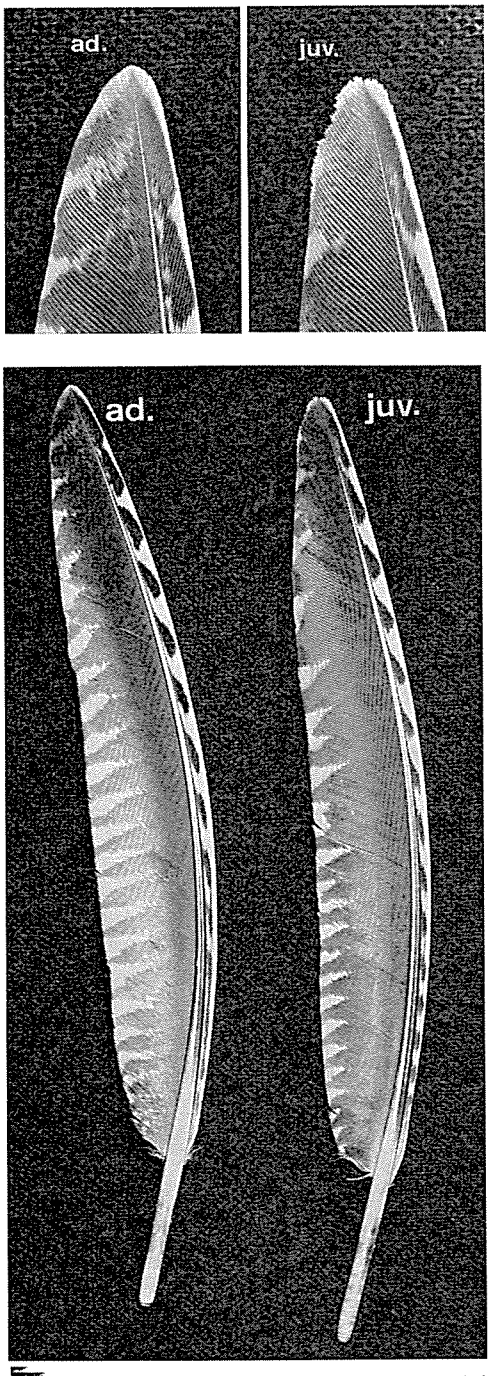


Fig. 1. Primary no. 10 (from inside) of an adult and a juvenile woodcock collected in November.
Fig. 1. Næstyderste håndsvingfjer (nr. 10 regnet indefra) af gammel og ung skovsneppe fra nov.

one (see also p. 8). Although the primaries may be only little worn or not at all, on closer investigation it is almost always possible to decide whether they originate from an adult or a young bird, as the edge of an unworn feather from a young bird always has a »woolly« appearance. This is due to the barbules which form small regular v-shaped indentations at each barb, which is not the case in the adult birds.

As the degree of wear inwardly decreases, the changeover between feathers in which wear can be recognised and those in which it cannot is often difficult to distinguish. In spite of this uncertainty, it has been attempted in all cases to determine the point at which wear is no longer evident, and in Table 4 and Fig. 2 this is given.

As was previously mentioned, there is no moulting of the primaries in winter, and consequently in young birds the wear is even more pronounced in spring (March–April). As the wear of the primary feathers of adult birds is still very little at this time (in the majority, the feathers appear unworn), the difference in wear is more evident in spring than in autumn. This is also clear from Table 4 and Fig. 2, which illustrate the fact that on average, the wear includes more feathers in the spring than in the autumn.

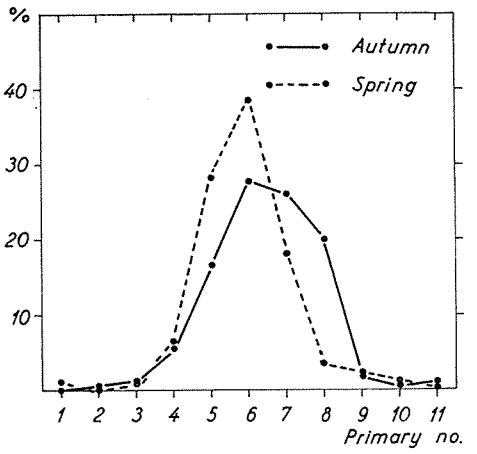


Fig. 2. The last primary in juvenile woodcock, on which wear can be recognized. The curves are based on 424 woodcock from autumn (Oct - Dec) and 287 from spring (Mar – Apr). See also Table 4.
Fig. 2. Sidste håndsvingfjer hos juvenile skovsnepper, hvor slitage kan erkendes. Nummerering af fjerene er regnet indefra. (Se også tabel 4).

TAIL FEATHERS

Adult woodcock replace the tail feathers before the autumn migration. STRESEMANN (1966) states that the tail moult of adult waders normally begins with the central pair and continues outwards, although however in several species the outer pair is moulted before the penultimate outer pair. Moulting of the tail feathers is completed before the moulting of the primaries is finished.

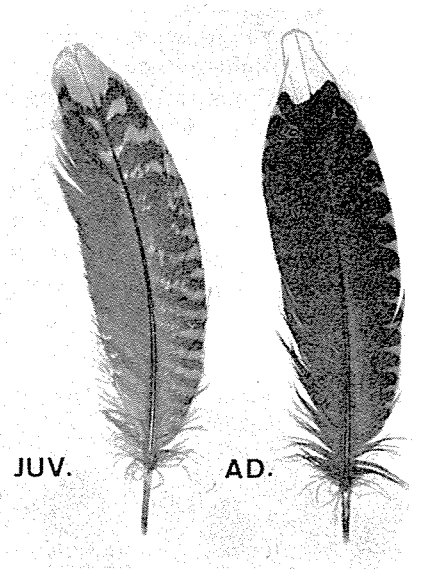
The material available affords no possibility of determining tail feather moult in adult woodcock, as it did not comprise individuals in which this was taking place.

According to STRESEMANN (1966), the tail feather moult of young waders is not completely understood. The present investigation showed that in some juvenile woodcock, a complete moult of the tail feathers occurs in the first autumn, while in others, there is only partial or even no replacement of the tail feathers. In the material there were in addition examples which suggested that juvenile birds presumably do not follow the normal sequence of tail feather moulting found in adult birds. For example, in two individuals from 2nd and 10th October, the 5 outer pairs of tail feathers were almost fully developed, while the central pair in the one bird was hardly half length, and in the other the tips of the feathers were only just out of the feather papilla. In an individual from 8th October the two central tail feathers were not moulted, while the remainder on the one side were in growth. On the other side neither the next inner nor the outer tail feather were moulted, while the rest were in growth.

The difference between juvenile and adult tail feathers is in general clear. In adults, the light spot on the underside is bright-white, whereas on juvenile tail feathers it is a dull greyish-white. The light-brown patterns of the juvenile tail feather are more prominent and also more diffuse than in the adult feather, where the light-brown spots are usually well-defined. The overall impression of juvenile tail feathers is that they appear more downy than adult tail feathers (Fig. 3).

Amongst the young birds in which only a partial moult of the tail feathers occurs, it is presumably always the central pair which are not replaced. This assumption is supported by the fact that these unreplaced feathers are generally a little shorter (from 2-10 mm.) than the moulted feathers, and by the fact that they are more worn than the other feathers, and in most cases they are typical juvenile feathers.

In 175 young birds from October–December, of which some were age determined according to the degree of wear of the primaries, 42 % possessed either typical juvenile tail feathers and/or the central pair of feathers was shorter than the total tail length. In 120 young birds shot during the spring (March–April), the figure was 31 %. This suggests that in some young birds a tail moult occurs during the winter, and this is also supported by the fact there is a difference in the average tail length of these birds in spring and autumn (see p. 14 and Table 6).



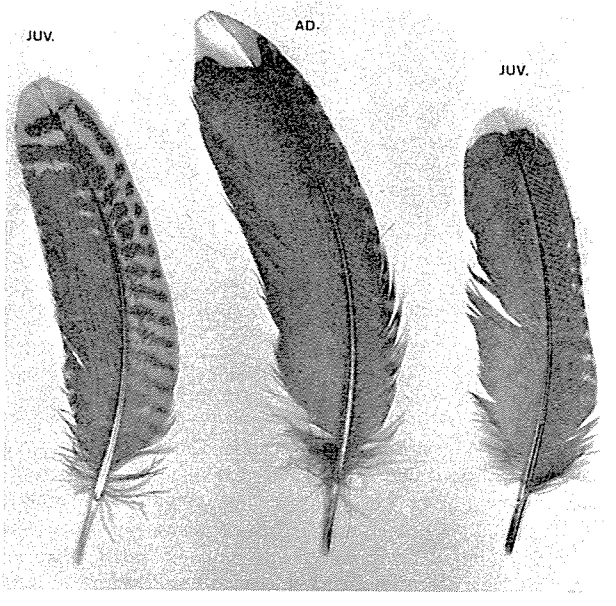


Fig. 3. Tail feathers of woodcock seen from below. The light distal spot on a juvenile tail feather is dull greyish-white, on an adult it is pure white. The spot is often more narrow on the juvenile feather than on the adult.

Fig. 3. Undersiden af juvenile og adulte halefjer fra skovsnepper. Den juvenile halefjers spids er mat røgfarvet, medens den adultes er skinnende hvid. Endvidere er den lyse spids ofte væsentlig mindre på den juvenile halefjer, end på den adulte.

PRIMARY COVERTS

On the primary coverts, there is a distal light fringe, which in young birds is usually of the same colour as, or slightly lighter than, the other light-brown spots on the primary coverts. In adult birds this fringe is usually distinctly lighter than the other light spots on the coverts (Fig. 4). The light-coloured fringe is generally 1.5–2.5 mm. wide in young birds, whereas in adults it is normally less than 1.5 mm. wide, and usually about 1 mm. wide. In a few adults this light-coloured fringe may be almost entirely lacking.

As a certain degree of overlap occurs, this criterion cannot be used with complete certainty for age determination, but it can be a useful character when taken in conjunction with the other characters described. For instance, it can be stated that if the fringe on the primary coverts is narrow (1 mm.) and distinctly lighter in colour, then there is a 90–95 % certainty that the feather originates from an adult bird. On the other hand, if the fringe of the primary coverts is wide (more than 1.5 mm.) and has the same colour as the other light spots of the coverts, then there is a 95–98 % certainty that the feather is from a young bird.

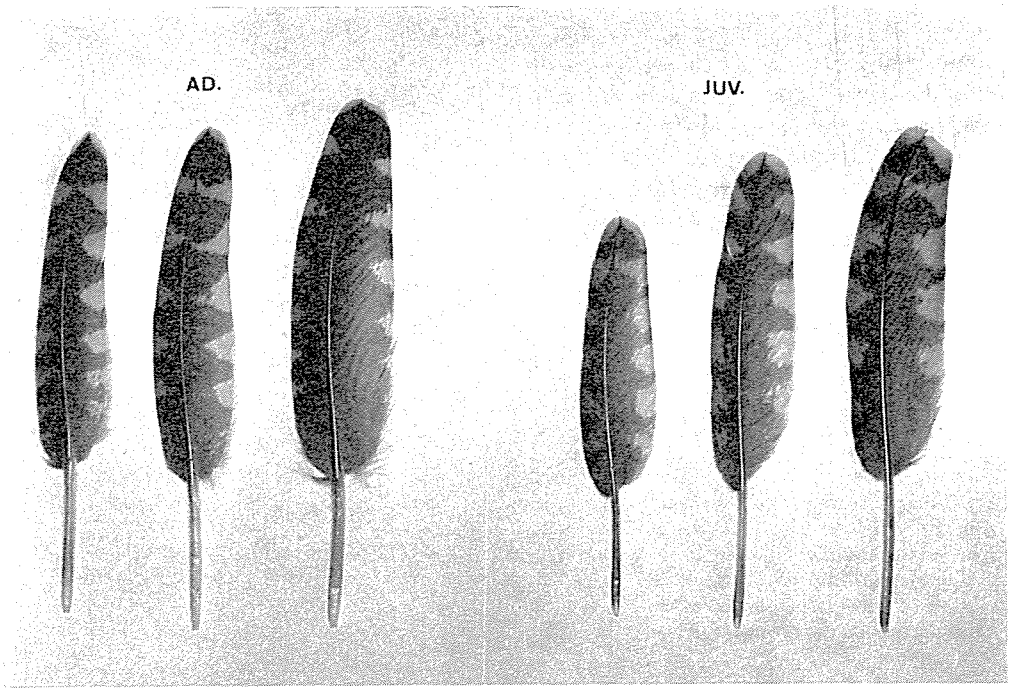


Fig. 4. Primary coverts from woodcock. The distal light fringe on the coverts from an adult is normally narrow and distinctly lighter than the other light spots on the covert. Coverts from a juvenile usually have a wide fringe of the same colour as the other light spots.

Fig. 4. Hånddækfjer af juvenil og adult skovsneppe. Den lyse bræmme yderst på hånddækfjeren er hos den adulte skovsneppe normalt smal og tydeligt lysere end de øvrige pletter på fjeren, medens bræmmen hos juvenile individer normalt er bred og af samme farve som de øvrige lyse pletter.

BASAL COLOUR OF WING

The basal colour of the wing in young birds is normally a lighter grey-brown than in adult birds, in which it is a dark grey-brown and occasionally dark brown. This difference is seen most distinctly when several wings are available for comparison. In about 90 % of the adults, the basal colour of the wing is dark grey-brown to dark brown, whereas in about 80 % of young birds the basal colour of the wings is a lighter grey-brown.

CONCLUSION

Investigations have shown that the age of the woodcock can be determined on the basis of the wear on the primaries, since in young individuals these are worn, whereas this is not the case for adult birds. In a few young birds, presumably from late clutches, the primaries are only little or not at all worn, and in these cases age determination is more difficult. However, on closer investigation it can be seen that the primaries of these young birds have a »wolly« appearance, while the same feathers in adult birds are sharply delimited. In all those young birds in which a very small amount of wear of the primaries has occurred juvenile tail feathers were present, which enabled an accurate age determination to be made.

The presence of juvenile tail feathers may be used with certainty to determine the age of young birds. Approximately 42 % of the young birds from the period October–December have either possessed juvenile tail feathers or else the central tail feathers were less than the total length of the tail, while in spring (March –April) the corresponding figure was 31 % of young birds.

The breadth and colour of the outer fringe of the primary coverts and the basal colour of the wing may also be used as supplementary criteria in age determination.

Age determination on the basis of the degree of wear of the primaries can be employed from the cessation of the breeding season and throughout the period until the moulting of the primary feathers the following summer.

Sex determination

In several waders such as curlews, godwits and snipes, the bill of the female is on average longer than that of the male (WITHERBY et al. 1943, ARNHEM 1968). This is also true in the case of the woodcock. Measurements of the length of the tail also show differences between male and female woodcock.

In order to investigate these differences and with the aim of determining criteria for sex determination, measurements were made of the bill and tail length of sex and age determined individuals obtained by shooting. In addition the bill lengths of skin specimens from the Zoological Museum of Copenhagen were also measured.

BILL LENGTH

The length of the bill was measured as illustrated in Fig. 5. The material examined comprised a total of 251 males and 199 females. The measurements indicate that in young birds, the bill is already fully grown by autumn (October–November) (Table 5). It might be expected that the bill length of skin specimens is shorter on average due to drying out, than that of fresh specimens. However, the measurements show that in the case of adult birds there is probably only a minor difference, while in young birds the reduction is a little greater. To judge from the material, the reduction in bill length is only of the order of 1 %, and it can thus be considered of no importance. As a result all bill measurements from both young and adult birds were placed together in one group, and the distribution is shown in Fig. 6.

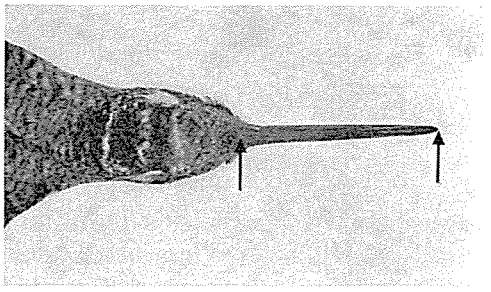


Fig. 5. The length of the bill is measured as shown on the figure from tip to cere.

Fig. 5. Næblængden er målt som vist på figuren fra spids til vokshud.

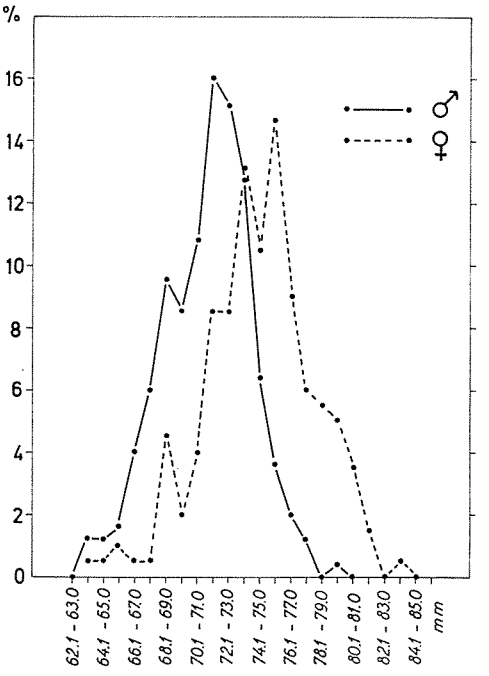


Fig. 6. The percentage distribution of the bill length from 251 ♂♂ and 199 ♀♀ of woodcock.

Fig. 6. Procentvis fordeling af næblængden hos 251 ♂♂ og 199 ♀♀ af skovsneppe.

The bill length of the males is on average 71.2 mm., ranging from 63.5 mm. to 80.0 mm. In females the average length is 74.5 mm., ranging from 63.5 mm. to 83.4 mm. The bill of a female is thus on average 3.3 mm. longer than that of a male. It was found from the data that only one male out of 251 had a bill which exceeded 78 mm., whereas the bill of 32 out of 199 females did so. Thus individuals in which the bill length exceeds 78 mm. can correctly be determined as females with approximately 98 % certainty. However, although males on average have shorter bills than females, the amount of overlap among individuals with small bill lengths is so great that sex determination cannot be performed with certainty on the basis of bill length alone.

	Period *Periode*	Number *Antal*	Range mm. *Ydergrænser* mm	Average mm. *Gens.* *mm*	Measured from *Målt på*
ad ♂	all year	103	63.6–80.0	71.7	Fresh specimens
ad ♂	all year	12	68.6–75.8	71.1	Skins
juv ♂	Sep.–Jan.	26	66.6–75.0	71.3	Fresh specimens
juv ♂	Mar.–Apr.	61	63.5–76.0	70.8	Fresh specimens
juv ♂	Sep.–Jan.	29	65.1–77.4	70.8	Skins
juv ♂	Mar.–Apr.	20	66.2–76.5	70.2	Skins
♂	all year	251	63.5–80.0	71.2	
ad ♀	all year	69	66.7–81.2	74.7	Fresh specimens
ad ♀	all year	21	63.5–80.9	74.7	Skins
juv ♀	Sep.–Jan.	29	70.5–79.7	74.7	Fresh specimens
juv ♀	Mar.–Apr.	34	68.8–82.0	74.8	Fresh specimens
juv ♀	Sep.–Jan.	28	64.9–83.4	73.8	Skins
juv ♀	Mar.–Apr.	18	65.2–81.2	73.7	Skins
♀	all year	199	63.5–83.4	74.5	

Table 5. Bill length of the woodcock.
Tabel 5. Næblængde hos skovsnepper.

TAIL LENGTH

Measurements of the tail length indicate that on average males have longer tails than females (Table 6). As mentioned previously (p. 8) not all young birds moult the juvenile tail before the autumn migration, and as a result the average tail length of young birds is less than that of the adults. In autumn, the tail length of young birds is 5–8 % less than that of the adults, while in spring the difference is only 3–4 %. This lesser difference in spring supports the impression that some young birds moult their tail feathers during the winter season.

The tail length of adult males is on average 85.9 mm., ranging from 78 to 96 mm., and for adult females the average length is 82.4 mm. ranging from 77 to 88 mm. (Fig. 7). All individuals with tail lengths exceeding 88 mm. are males, and all those with a tail length of under 78 mm. are females. Thus about 20 % of males can be sex determined on the basis of tail length alone, whereas for females only a couple of percent can be sexed in this way.

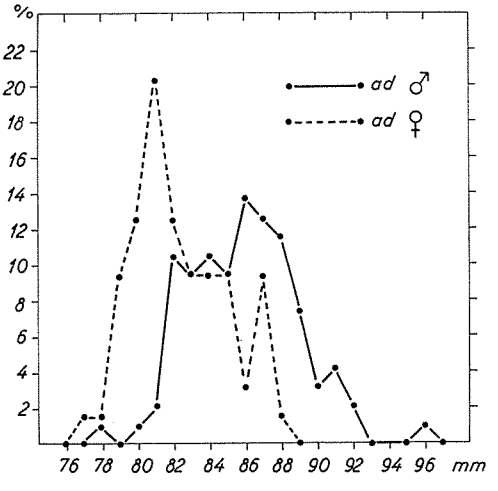


Fig. 7. The percentage distribution of the tail length from 95 adult ♂♂ and 64 adult ♀♀ of woodcock.

Fig. 7. Procentvis fordeling af halelængden hos 95 adulte ♂♂ og 64 adulte ♀♀ af skovsneppe.

	Period *Periode*	Number *Antal*	Range mm. *Yder-grænser mm*	Average mm. *Gennem-snit mm*
ad ♂	Sep.–Jan.	24	82–92	86.9
ad ♂	Mar.–Apr.	71	78–96	85.6
juv ♂	Sep.–Jan.	26	68–87	80.6
juv ♂	Mar.–Apr.	57	71–93	83.2
ad ♀	Sep.–Jan.	19	77–88	82.3
ad ♀	Mar.–Apr.	45	78–87	82.4
juv ♀	Sep.–Jan.	25	66–86	78.4
juv ♀	Mar.–Apr.	32	75–86	81.6
ad ♂	All year	95	78–96	85.9
ad ♀	All year	64	77–88	82.4

Table 6. Tail length of the woodcock. All measurements from fresh specimens.

Tabel 6. Skovsneppens halelængde. Alle mål er taget på friske individer.

TAIL/BILL RATIO

Neither the tail length nor bill length is particularly suitable for use in sex determination of the woodcock. However, advantage can be taken of the fact that the tail of males is on average longer than that of females, and that females have longer bills than males, and the tail/bill ratio calculated. The difference between males and females is thus accentuated beyond that which would be possible if tail and bill lengths were employed separately.

The tail/bill ratio for 94 males was on average 1.20, ranging between 1.10 and 1.39. For 62 females the average value was 1.10, ranging between 1.01 and 1.20 (Fig. 8). However, in one single female the ratio was found to be 1.25. Ignoring this value, it is found from calculations that individuals with a tail/bill ratio of under 1.10 are females, while those with a tail/bill ratio more than 1.20 are all males. Using these criteria, 42 % of the adult males and 46 % of the adult females can be sexed.

As mentioned previously, the bills of young birds are already fully-grown in autumn, whereas the tail length is on average shorter than in adult birds. Consequently the tail/bill ratio in young birds will on average also be less than the ratio in adult woodcock (Fig. 8). The average value of the tail/bill ratio of 81 young males was 1.17, ranging from 1.00 to 1.37, while the average for 54 young females was 1.07, ranging from 0.90 to 1.20. Thus as long as the tail/bill ratio of an individual is less than 1.00, it will be a female. If the tail/bill ratio is greater than 1.20, then it is a male. Using these criteria, 28 % of young males and 20 % of young females can be sexed.

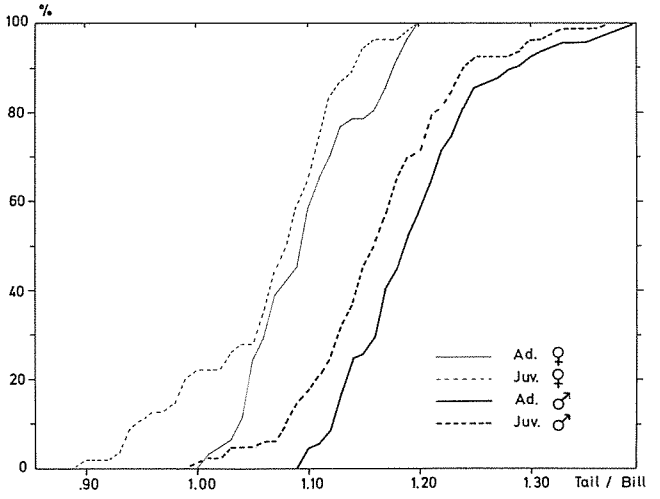


Fig. 8. Cumulative distribution of the tail/bill ratio from the woodcock.

Fig. 8. Kumulativ fordeling af hale/næb forholdet hos skovsneppe.

CONCLUSION

On average, the tail of the male woodcock is longer than that of the female, whereas on the other hand the female has a longer bill than the male. However, the degree of overlap is so great that these factors can only be used separately for sex determination in relatively few cases.

By using the tail/bill ratio, in which advantage is taken of the differences mentioned in tail and bill lengths of males and females, sex determination can be performed on 42 % of the adult males, 46 % of the adult females, 28 % of the young males and 20 % of the young females.

Comparing the tail/bill ratio with the tail and bill lengths taken separately, approximately half of the adult woodcock can be sex determined, while this is the case for about one-third of the young males and one-quarter of the young females.

Dansk resumé

Alders- og kønsbestemmelse af Skovsneppen *(Scolopax rusticola)*.

Aldersbestemmelse

Det undersøgte materiale omfatter 137 skovsnepper fra 21. september–10. februar (tabel 1). I denne periode kan fuglene aldersbestemmes, idet ungfugle har en bursa fabricii, medens de adulte ingen har. Bursas dybde aftager med tiden (tabel 2) og er helt forsvundet inden kønsmodningen om foråret. Bursa-undersøgelser kan kun foretages ved at snitte kloaken op.

Undersøgelserne viser, at skovsnepper kan aldersbestemmes på grundlag af håndsvingfjerenes slitage, idet disse hos ungfuglene er slidte, hvilket ikke er tilfældet hos de adulte (fig. 1). Slitagens omfang hos ungfuglene varierer fra individ til individ (tabel 4 og fig. 2). Hos enkelte ungfugle (formodentlig fra sene kuld) er håndsvingfjerene ikke eller kun lidt slidte. Nærmere eftersyn viser imidlertid, at håndsvingfjerene hos disse ungfugle har en »ulden« kant, medens de hos adulte er skarpt afgrænsede. Ungfugle med ingen eller kun lidt slitage har altid haft juvenile halefjer, hvorefter alderen med sikkerhed har kunnet bestemmes.

Forskelle mellem juvenile og adulte halefjer er som regel tydelig, idet den lyse plet på undersiden hos de adulte er skinnende hvid og hos ungfuglene mat gråligthvid. De lysebrune pletter er endvidere mest fremtrædende hos ungfuglenes halefjer (fig. 3). 42 % af 175 ungfugle fra oktober–december og 31 % af 120 ungfugle fra marts–april kunne aldersbestemmes på grundlag af halens udseende.

Håndd ækfjerene har yderst en lys bræmme, som hos adulte fugle i næsten alle tilfælde er under 1,5 mm bred og over 1,5 mm hos ungfugle (fig. 4). Denne forskel kan med ca. 90 % sandsynlighed benyttes til aldersbestemmelse. Vingens bundfarve er hos ungfuglene normalt lysere end hos adulte skovsnepper.

Aldersbestemmelse af skovsnepper ved hjælp af håndsvingfjerenes slitage kan foretages i hele perioden fra ynglesæsonens afslutning og til svingfjerene fældes den følgende sommer.

Kønsbestemmelse

Hannernes næblængde er gennemsnitlig 71,2 mm mod hunnernes 74,5 mm (tabel 5 og fig. 6). Individer med en næblængde over 78 mm er med 98 % sikkerhed hunner (16 % af de målte hunner). Hos skovsnepper med korte næb er overlapningen så stor, at man ikke på næblængden alene kan afgøre kønnet.

De adulte hunners halelængde er i gennemsnit 82,4 mm mod 85,9 mm for de adulte hanner (tabel 6 og fig. 7). Alle individer med en halelængde over 88 mm (ca. 20%) er hanner, og alle med en halelængde under 78 mm (ca. 2 %) er hunner. Ungfuglene har i gennemsnit kortere hale end de adulte fugle. Ca. 15 % af de unge hanner kan kønsbestemmes på grundlag af halelængden (over 86 mm), medens kønsbestemmelse af unge hunner på grundlag af halelængden ikke er mulig.

Hale/næb forholdet er for adulte hanner i gennemsnit 1,20, varierende fra 1,10 til 1,39. Hos adulte hunner er gennemsnittet 1,10 med ydergrænser 1,01 og 1,20 (fig. 8). Alle adulte individer med et hale/næb forhold større end 1,20 er hanner og alle mindre end 1,10 er hunner. 42 % af de adulte hanner og 46 % af de adulte hunner kan kønsbestemmes ad denne vej.

Ungfugle med hale/næb forhold større end 1,20 er alle hanner, medens alle med et hale/næb forhold mindre end 1,00 alle er hunner. 28 % af de unge hanner og 20 % af de unge hunner kan kønsbestemmes ved hjælp af hale/næb forholdet.

Sammenholdes hale/næb forholdet med hale- og næblængde hver for sig, kan ca. halvdelen af de adulte skovsnepper kønsbestemmes, medens det for de unge hanner drejer sig om ca. en tredjedel og ca. en fjerdedel af de unge hunner.

Резюме на русском языке

Определение возраста и пола вальдмнепа *(Scolopax rusticola)*

Определение возраста

Исследованный материал охватывает 137 вальдшнепов с 21 сентября по 10 февраля (табл. 1). В течение этого периода возможно определить возраст птиц, так как bursa fabricii имеется только у молодых птиц, а у взрослых – отсутствует. Глубина bursa со временем уменьшается (табл. 2), и совершенно исчезает перед достижением половой зрелости весной. Исследования bursa можно произвести только разрезав cloaca.

Исследования показывают, что возраст вальдшнепов можно определять на основании износа первостепенных маховых перьев, так как у молодых птиц они изношены, а у взрослых не изношены (фиг. 1). Степень износа у отдельных молодых особей неодинакова (табл. 4 и фиг. 2). У некоторых молодых птиц (вероятно из поздних выводков) первостепенныэ маховые перья не изношены, или изношены только незначительно. Однако, при более тщательном исследовании оказывается, что первостепенные маховые перья этих молодых птиц имеют »шерстистый« край, между тем как у взрослых птиц край четко ограничен. У молодых птиц без износа или с незначительным износом всегда были юностные рулевые перья, по которым было возможно достоверно определить их возраст.

Как правило, разница между юностными и взрослыми рулевыми перьями очевидна, так как светлое пятно на нижней стороне у взрослых ослепительно бело, а у молодых птиц матово-серовато-бело. Кроме того, на рулевых перьях молодых птиц более четко выступают светло-бурые пятна (фиг. 3). У 42% из 175 молодых

птиц от октября до декабря, и у 31% из 120 молодых птиц от марта до апреля, возраст было возможно определить на основании вида их хвоста.

Большие кроющие крыла у конечности имеют светлую кайму, ширина которой у взрослых птиц почти во всех случаях менее 1,5 мм, а у молодых более 1,5 мм (фиг. 4). Эта разница с 90% достоверности может служить для определения возраста. Цвет фона крыла у молодых птиц нормально бывает светлее, чем у взрослых вальдшнепов.

Определение возраста вальдшепов по износу первостепенных маховых перьев может производиться в продолжение всего периода от окончания сезона размножения до линяния маховых перьев следующим летом.

Определение пола

Длина клюва у самцов составляет в среднем 71,2 мм, а у самок 74,5 мм (табл. 5 и фиг. 6). Особи с длиной клюва более 78 мм с 98% вероятности являются самками (16% всех исследованных самок). У вальдшнепов с короткими клювами частичное совпадание так велико, что их пол невозможно определить только по длине клюва.

У взрослых самок, длина хвоста составляет в среднем 82,4 мм, а у взрослых самцов 85,9 мм (табл. 6 и фиг. 7). Все особи, хвосты которых длиннее 88 мм (прибл. 20%), являются самцами, а все с хвостами короче 78 мм (прибл. 2%) – самками. У молодых птиц средняя длина хвоста короче, чем у взрослых. У прибл. 15% из молодых самцов, их пол можно определить на основании длины хвоста (более 86 мм), между тем как определение пола молодых самок по длине хвоста невозможно.

Отношение длины хвоста к длине клюва у взрослых самцов в среднем составляет 1,20, с колебаниями от 1,10 до 1,39. У взрослых самок, среднее число равно 1,10, с предельными величинами 1,01 и 1,20 (фиг. 8). Все взрослые особи, у которых отношение длины хвоста к длине клюва превышает 1,20, являются самцами, а все с отношением ниже 1,10 – самками. Этим путем возможно определение пола 42% взрослых самцов и 46% взрослых самок.

Молодые птицы с отношением длины хвоста к длине клюва выше 1,20 все являются самцами, а все с отношением ниже 1,00 – самками. Определение пола на основании отношения длины хвоста к длине клюва возможно у 28% молодых самцов и у 20% молодых самок.

Сличая отношение длины хвоста к длине клюва с длиной хвоста и клюва в отдельном, возможно определить пол прибл. половины всех взрослых вальдшнепов, между тем как у молодых самцов это возможно у прибл. одной трети их, а у молодых самок у прибл. одной четверти.

Literature

Anonym 1969: Eley Game Advisory Station. – Annual Review 1968/69: 77–79.

Arnhem, J. et R., 1968: Guide du Bagueur. – Institut royal des Sciences naturelles de Belgique. – Bruxelles.

Bettmann, H., 1961: Die Waldschnepfe. – München-Solln.

Clausager, I., 1972: Skovsneppens forekomst og jagtlige udnyttelse i Danmark (duplikeret). – Vildtbiologisk Station, Kalø.

Garavani, E., 1965: Moeurs, migrations et chasses de la becasse. – Paris.

Sheldon, W. G., Greeley F., Kupa J., 1958: Aging fall-shot American Woodcocks by primary wear. – The Journal of Wildlife Management 22: 310–312.

Stresemann, E. und V., 1966: Die Mauser der Vögel. – Journal für Ornithologi. 107. Sonderheft.

Witherby, H. F., et al., 1943: The Handbook of British Birds, Vol. IV. – London.

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