

A Study of the Display of the Ruff (*Philomachus pugnax* (L.)). II.

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(Med et dansk resumé: En undersøgelse af Brushanens (*Philomachus pugnax* (L.)) parringsspil. II).

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On the basis of observations of three days and nights we wrote an article in 1952 about the display of the ruff especially emphasizing the composition of the community and the behaviour of the individual birds as a part of it (BANCKE & MEESENBURG 1952). These observations, however, only covered a small part of the season, and in order further to extend our knowledge of the life of the "hill", we decided in 1952 to observe the same "hill" each Saturday from 2–22 o'clock during the whole season.

We wish to thank Professor R. SPÄRCK and Dr. Å. VEDEL TÅNING for their interest in our work, and because they have made it possible for us to undertake our examinations.

Further we thank KNUD STORGÅRD, M. Sc. for his assistance at the corresponding observations of May, 1953. Finally we thank Mrs. E. MEESENBURG for translating the MS.

The method was the same as used at the examinations in 1950: Making notes on the birds' arrival at and departure from the "hill" and sampling as much information of their behaviour as possible. Unfortunately the ruffs anticipated us, as instead of as usual to start their activity in the last week of April they already started in the middle of the month. We did not, therefore, get the opportunity of observing the actual occupation of the "hill".

We opened our previous article by giving our classification of the males on the "hill", but our new study have necessitated a new classification, as follows:

- I. By *owners* we mean the males that have a fixed run on the "hill". The owners are subdivided into:
 - a. The *steady* owners that faithfully stay on the "hill" throughout the day and do not leave it with departing reeves.

- b. The *unsteady* owners that mostly stay on the "hill" only in the periods of activity, and those which leave the "hill" with departing reeves.
- II. By *whites* we mean the males with white ruffs. These ruffs are allowed to enter the "hill", but have no run and do not take part in the territorial fights.
- III. By *guests* we mean the males that are not allowed to enter the "hill".

Material.

General description of the activity on the "hill" on the days of observation, referring to fig. 1-4 and tables I-II.

19. *April* (fig. 1). Steady wind from WNW, in the course of the day changing to SSE. Changing clouds. Haze. Relatively cool. 4 steady owners, but these owners are inclined to relieve, 1) partly when visiting reeves, and when whites and guests leave the "hill", 2) partly when flocks of ruffs are passing near the "hill". Certainly the flock-instinct from the winter season is still dominating over the attachment to the "hill" (cf. SELOUS 1905-07). But they usually return to the "hill" shortly after. The ruffs are not particularly active, but there is a greater number of visits than on the next two days of observation. Distinct morning- and afternoon maximum (table II).

26. *April* (fig. 1). In the morning fresh NW-breeze, falling light and later changing to slight ESE-wind, thunder shower late in the afternoon. Almost during all the day Common Gulls are present and disturb the play. 3 steady owners which often leave the "hill" owing to the presence of the gulls. Now and again no. 3 is a little unsteady (hops most eagerly when flocks of ruffs are passing). A single time all owners leave the "hill" at flock-passing. A very small number of visiting reeves and ruffs of all categories. Little activity.

3. *May* (fig. 1). Steady wind to breeze from ESE to E. Few clouds. Warm. 3 steady owners (no. 1, 3, 4), while no. 2 is absent for a long time during the inactive periode and leave the "hill" about 2 hours before no. 4. Still some inclination to fly up when flocks are passing. Increasing number of guests, whites and reeves.

10. *May* (fig. 2). Light air in the morning from SW, later in the day changing to WNW. Overcast sky. A little drizzle in the forenoon. 4 steady owners (no. 1, 3, 4, 6) and 1 unsteady (no. 5), which leaves the "hill" with reeves, is absent for long periods and leaves the "hill" early in the evening. No. 6 is a little unsteady, too. Flock-inclination ceased. Increasing activity.

17. *May* (fig. 2). Light air, in the morning from SE, changing to WSW. Few clouds. Warm. 4 steady owners (no. 1, 3, 4, 6) and 4 unsteady owners (no. 5, 7, 8, 9). No. 8 is, however, different from the others by its steadiness. Notice the frequent departures of nos. 5, 7

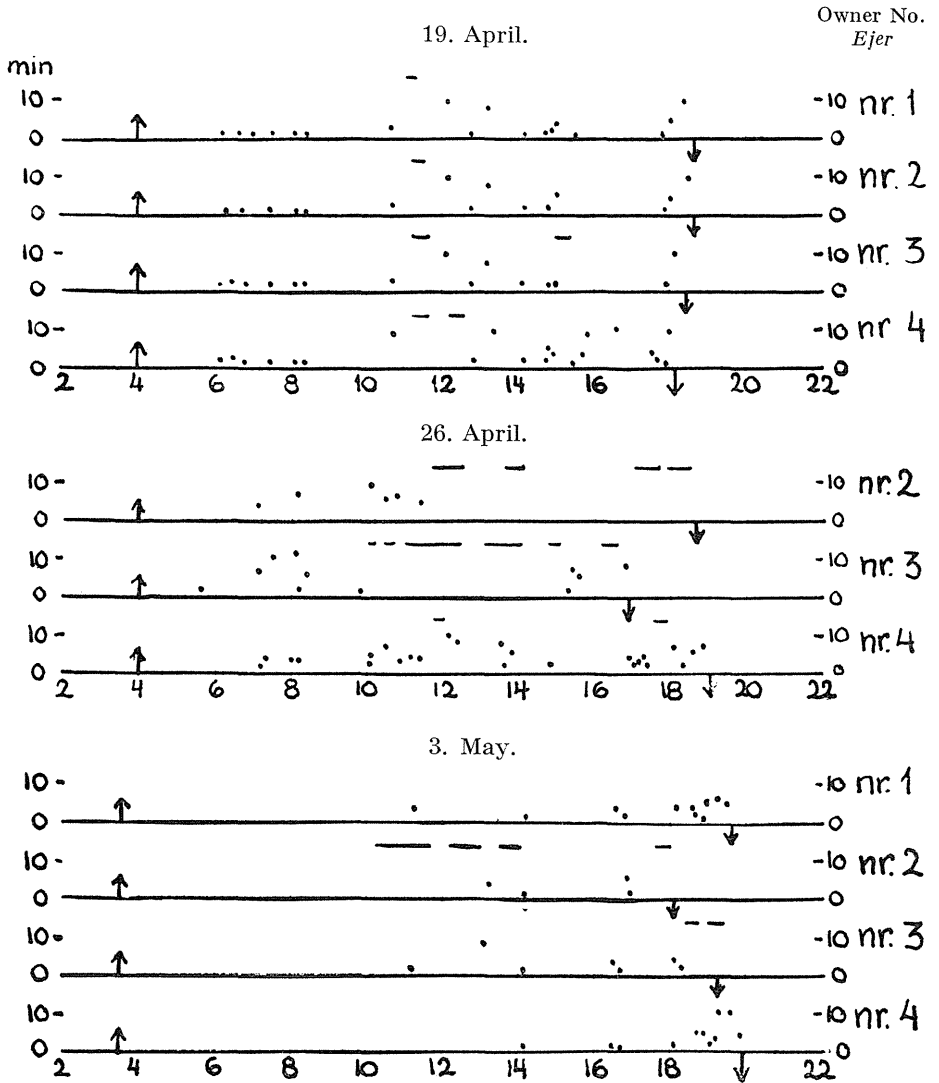


Fig. 1. This and the following three figures show the owners' presence on the "hill". The absence from the "hill" of all the owners is indicated by dot- and dash-signatures. Absences of 1-10 minutes are stated by dots, referring to the 0-10 minute scale at the sides of the table, whereas absences of more than 10 minutes are marked as dash-signatures, referring to the hour scala below the table. The owners' first arrival at and departure from the "hill" are indicated by arrows.

Fig. 1-4 viser ejernes tilstedeværelse på skogerpladsen. Ved hjælp af prik- og stregsignaturer er for hver af ejerne angivet dennes fravær fra skogerpladsen. Fravær af en varighed på 1-10 minutter angives ved prikker, der refererer til sideskalaen, mens fravær på over 10 minutter angives ved stregsignatur, der refererer til den fortløbende tidsskala forneden. Med pile er angivet ejernes første ankomst til og sidste afgang fra skogerpladsen.

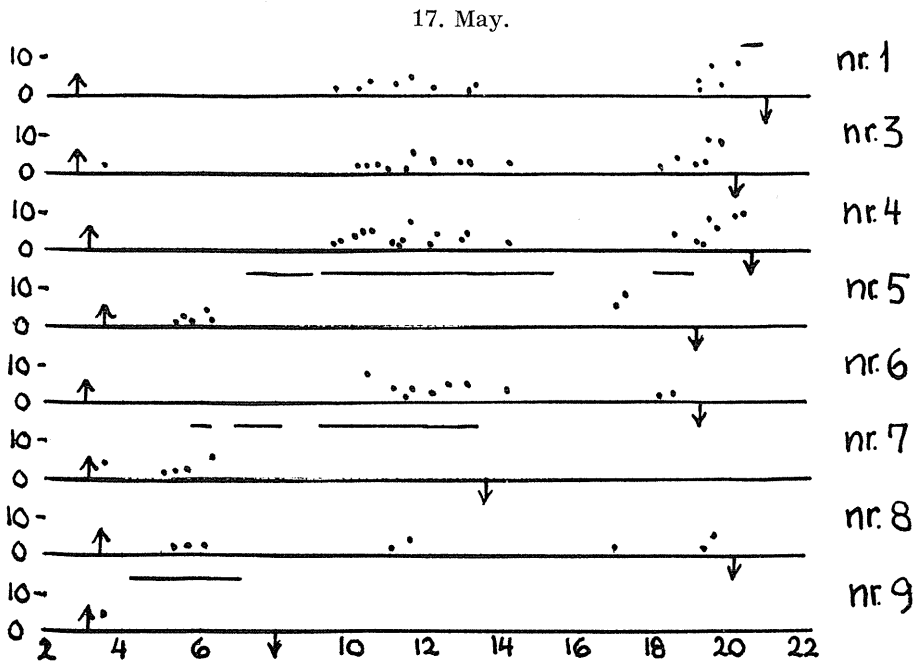
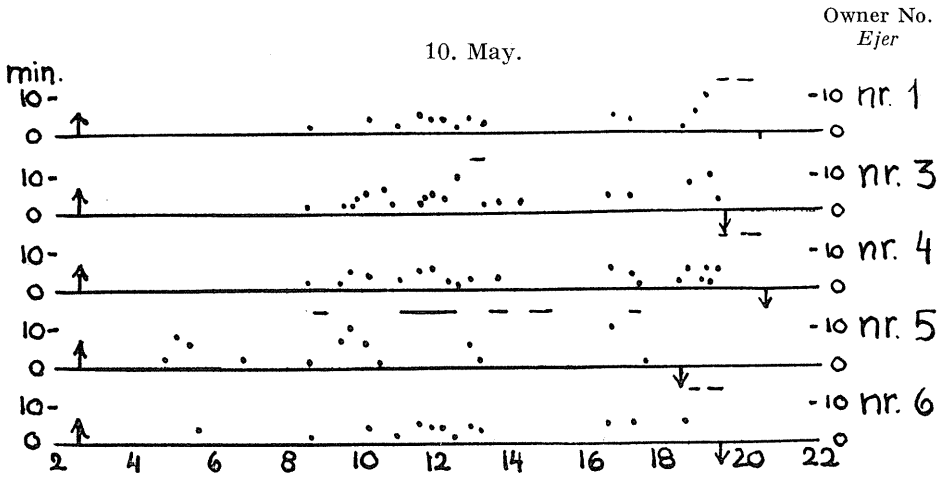
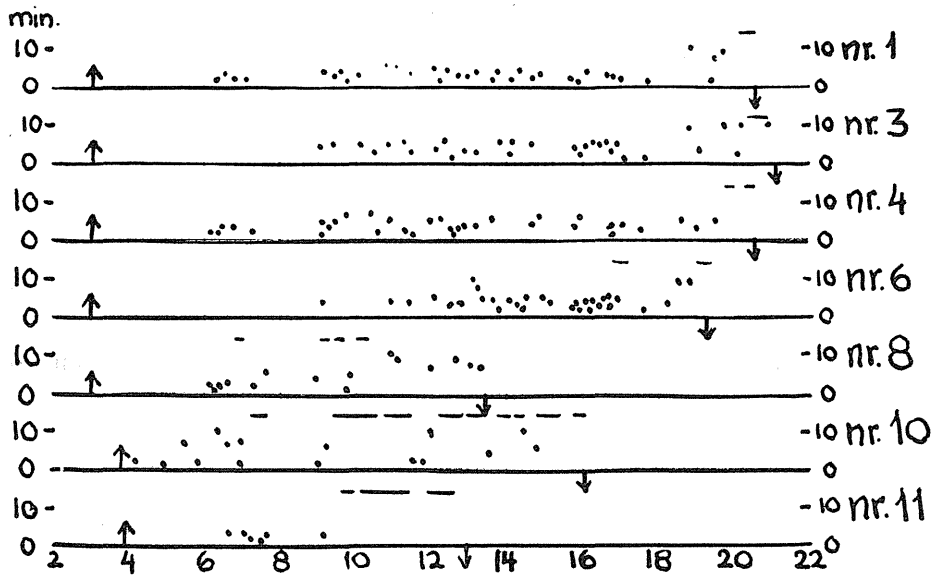


Fig. 2. Cf. caption to fig. 1. (Se tekst til fig. 1).

24. May



31. May

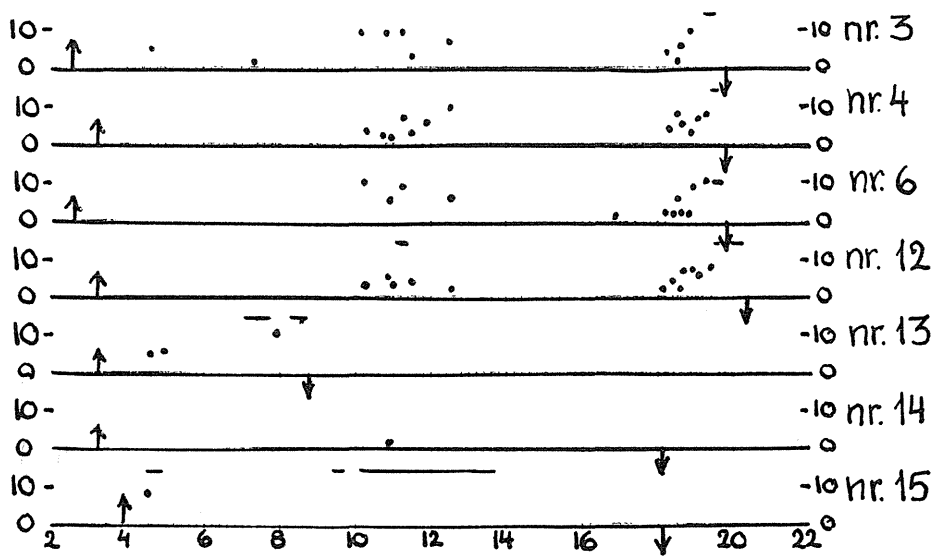
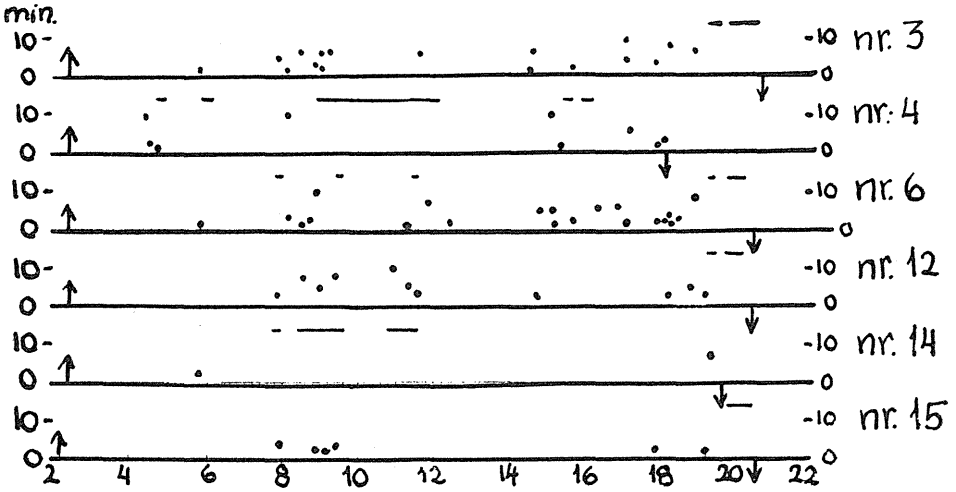
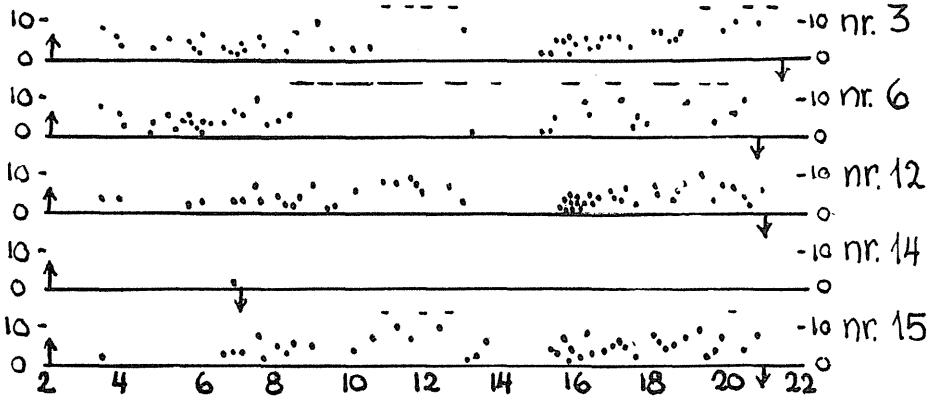


Fig. 3. Cf. caption to fig. 1. (Se tekst til fig. 1).

7. June



14. June



21. June

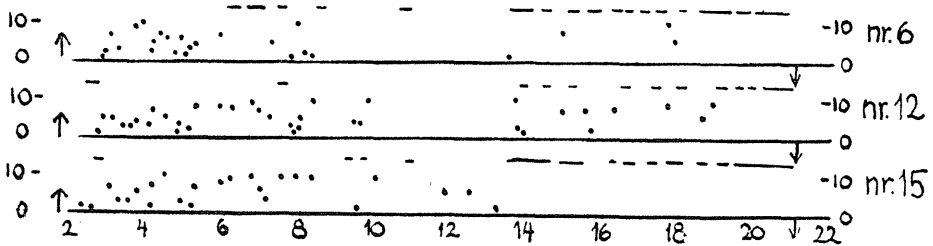


Fig. 4. Cf. caption to fig. 1. (Se tekst til fig. 1).

and 8 together with leaving reeves (cf. table I). The activity has season culmination (maximum between 4 and 5 a. m. o'clock) with distinct morning and afternoon maximum. The whites are present on the "hill" throughout the day (table II).

24. *May* (fig. 3). WNW-NNE breeze, half clouded. Mild. Overcast sky in the evening. 4 steady owners (no. 1, 3, 4, 6) and 3 unsteady owners (no. 8, 10, 11). The central, unsteady no. 8 is, however, relatively faithful. Much decreasing activity. No distinct maximum.

31. *May* (fig. 3). Light air from W, in the evening moderate NE-wind. Few clouds. Warm. 5 steady owners (no. 3, 4, 6, 12 and the peripheral no. 14) and 2 unsteady owners: no. 13 with a central run—about 8 o'clock driven out by no. 15—and no. 15, who is, however, faithful apart from the inactive forenoon period. Notice no. 14's faithfulness; only 1 minute foraging pause. No. 3 is often absent to forage. N.B.: The observer slept one hour in the morning activity period (in the interval 0520-0700).

7. *June* (fig. 4). Moderate wind increasing to breeze from W. Half clouded. Cool. 5 steady owners, but the faithfulness is not constant, since only no. 12, 14 and 15 (the new central owners) are really faithful, while the old owners, no. 3 and 6, especially no. 6, have become somewhat unsteady, as they 1) leave the "hill" with flying whites and 2) often forage and especially during the afternoon activity period often leave the "hill". 1 unsteady owner (no. 4) was previously the most faithful owner. Relatively great activity. Maximum in number of reeves in the afternoon (table II).

14. *June* (fig. 4). Moderate wind to breeze from NW. Changing clouds. Rainshowers in the evening. Cool. 3 steady owners (no. 3, 12, 15) of which, however, no. 3 now and again leaves with reeves (table I). 2 unsteady owners (no. 6, 14). No. 14, however, mostly reminds us of the steady owners by its faithfulness, but it leaves the "hill" as soon as the morning activity has ceased. Distinct morning- and afternoon maximum, but the activity is much decreasing (table II).

21. *June* (fig. 4). Light to moderate wind. Changing clouds. Rain in the afternoon. The 3 owners are almost like each other in faithfulness, but no. 6 must rather be considered as unsteady, since it leaves the "hill" with reeves (table I). Very small activity without maxima, but nevertheless the owners visit the "hill" right to the end. In the course of the following week all activity on the "hill" ceases.

The Owners.

General.

As mentioned above, it is possible to make a distinction between two kinds of owners, the steady ones and the unsteady ones. With a few exceptions the steady owners are connected with the central runs and include two groups of

	19. IV.	26. IV.	3. V.	10. V.	17. V.	24. V.	31. V.	7. VI.	14. VI.	21. VI.	
1	-----		-----		-----						1
2	-----										2
3	-----						-----				3
4	-----						-----			4
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12							-----	-----	-----	-----	12
13										13
14							-----	-----	-----		14
15							-----	-----	-----	15

Fig. 5. Diagram showing the period of ownership of the individual owners of the "hill". The dates are shown above; roman numerals indicate the month.

..... Unsteady owner
 ----- Steady owner
 -.-.-.-.- Intermediate owner.

Fig. 5. Diagram over ejernes tilstedeværelse som ejere på skoggerpladsen.

..... Løs ejer
 ----- Fast ejer
 -.-.-.-.- Ejer af blandingstype.

individuals: 1) those present on the "hill" from the start of the season and 2) those which replace the first group at the end of the season.

The unsteady owners are generally connected with the peripheral runs. They include guests that without much resistance from the central owners penetrate into the border of the "hill" at the culmination of the season (10.-31. May), and now and then some of the steady owners at the beginning and at the end of their owner-time on the "hill". This is especially clear in the case of no. 15 before its occupation of the NE-run and in the case of no. 4 after its fall.

By comparison between the diagrams of activity of the different owners (figs. 1-4) and table I showing with whom

the owners leave the "hill", the bipartiting of the owner-group can be clearly seen. The unsteady owners must be regarded as *guests* that on account of the *steady* owners' superiority and ensuing tolerance establish themselves temporarily on runs at the border of the "hill". Our observations indicate that these special guests at the beginning behave as guests (not erecting their ruffs or taking part in the play) and then gradually behaving more like owners.

In 1955 two guests were observed fighting for a peripheral run, while the steady owners seemed to be quite uninterested. The period of ownership of the unsteady owners is usually extremely short, as the unsteady owners change continuously (fig. 5), to the effect that replacements may take place even during the same day of observation. The periods of absence of the steady owners are numerous, but are of short duration, while the unsteady owners are absent few times which are of long duration (fig. 1-4).

The conflicts on the "hill" assumably must be divided into two groups: 1) Fights of display which form part of the play and do not look very much like real fights. Mostly they take place as quick attacks from the run against one of the next owners or whites.

2) The territorial fights, during which guests are ousted or fights for the runs take place. These fights are often very violent and prolonged (cf. ANDERSEN, 1951, sect. 2. with reference to SELOUS, MELLQUIST, etc.).

The group of owners first to arrive are mainly old males; no. 1 has been caught on the same "hill" in 1948 and was an owner on the "hill" in 1950 (BANCKE & MEESENBURG 1952). Several replacements occur between these individuals during the first weeks, which causes numerous territorial fights in this period. Subsequently, the "hill" is quiet during most of the month of May in spite of the arrival of many unsteady owners.

About the first of June the old steady owners are on the decline, which causes a new troublesome period in the course of which a new group of owners occupies some of the central runs. Since these new-comers are possibly younger birds, the first group of owners of the next year will probably be a

combination of the two groups of owners from the previous year. This last period of fight continues throughout the season, but the fights of the last days of observation only take place among the new owners.

The distribution of owners on the "hill".

We refer to BANCKE & MEESENBURG 1952 concerning size and appearance of the "hill". The first ruffs on the "hill" are seen on 16. April. Fig. 6 presents in a diagramatic form the territorial fights taking place in the subsequent period. On 19. April the first four steady owners are observed on the four central runs. The position, however, has not been stabilized, since especially no. 2 several times violently fights no. 1 and no. 3. Notice that no. 4 is not implicated even if it soon proved to be the worst rival of no. 2; however, a few fights with no. 1 took place.

On 26. April the same owners are present except no. 1 that has possibly been driven away by no. 4 that now and again examines its old run. No. 2 is still hard pressed, especially by no. 4. 19 fights have been observed between those two birds, being especially violent when they arrive at the "hill" simultaneously. A few fights take place between no. 2 and no. 3.

On 3. May no. 4 has entered from the SE-run into the NE-run, while no. 2 has moved out into the "retreat-run". No. 1 has returned, but not to its original run. No. 4 seems not yet to be completely quiet, even if the fights decrease in violence and number. No. 2 keeps long eating pauses and disappears early from the "hill".

On 10. May the situation on the central runs is unchanged. Further, another steady owner, no. 6 has arrived, but this male twice follows leaving reeves. Finally the "retreat-run" (on 3. May owned by no. 2) has been occupied by an unsteady owner, no. 5, the first individual of its kind. One fight noticed.

On 17. May the previous steady owners are present, but besides no. 5 we observed further 3 unsteady owners, of which no. 8 on the SE-run was most faithful. More fights than formerly. Especially no. 1 is busy in all directions, but not with the unsteady owners.

On 24. May the same steady owners are present, while

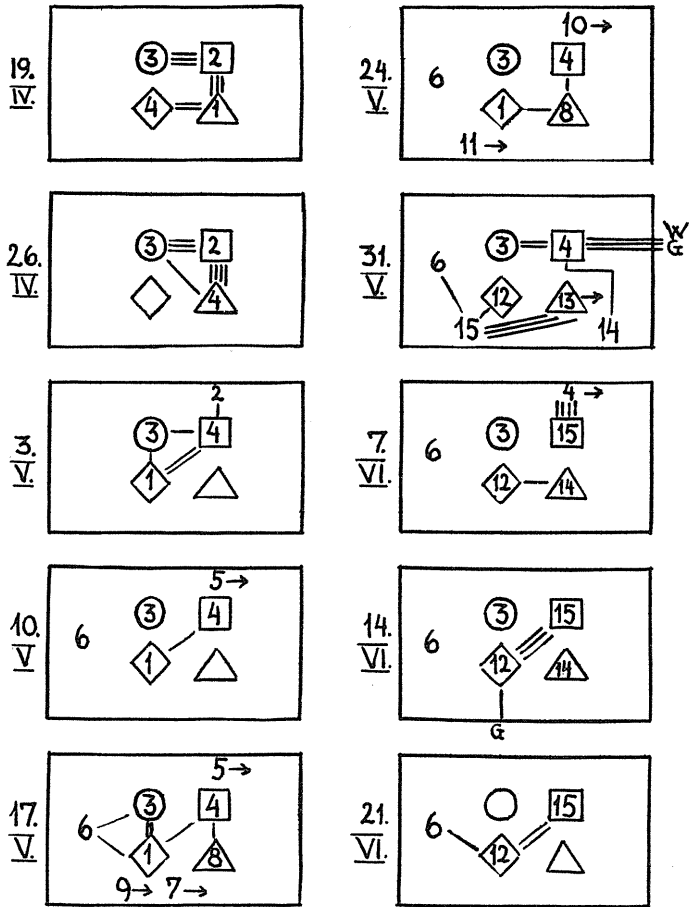


Fig. 6. Diagram of the "hill" with the central runs and the owners' placing during the days of observation. Dates are given at the left; roman numerals indicate the month.

○ NW-run □ NE-run ◇ SW-run △ SE-run

An arrow indicates the position of an unsteady owner. Lines connecting two owners or one owner with guest (G) and/or whites (W) indicate territorial fighting between the individuals in question. One line indicates slight fighting, four lines fierce fighting. Two and three lines indicate fighting of intermediate force.

Fig. 6. Diagram over skogerpladsen med de centrale ståsteder og ejernes placering på observationsdagene.

○ NV-ståsted □ NØ-ståsted ◇ SV-ståsted △ SØ-ståsted

En pil angiver løs ejer. Linier, der forbinder to ejere eller én ejer med gæster (G) og/jeller hvide (W) angiver territoriale kampe mellem de forbundne brushaner. En linie angiver let kamp. To eller tre linier angiver kampe af intermedier styrkegrad, fire linier hård kamp.

the distinctly unsteady peripheral owners are all replaced, and two others have arrived in their places. At this time the steady owners seem to be most tolerant to guests. Thus the places of nos. 8, 10 and 11 are occupied by guests later in the afternoon; a short time there were 4 guests on the "hill". A quiet day.

On 31. May the quiet period is over, as the successors of the first group of steady owners have arrived. No. 1 has been replaced by the steady owner, no. 12, and during the morning hours no. 15 drives the unsteady owner, no. 13 away from the SE-run. The steady owner, no. 14 stands waiting on a peripheral run. No. 4 seems to be very nervous and is especially hunting with whites and guests. Only no. 3 and no. 6 stand unconcerned on their old runs.

On 7. June the replacements have taken place. No. 4 is still fighting for its run in the early morning with no. 15, but after this it is degraded to an unsteady owner. No. 14 has entered into the SE-run. No. 3 and no. 6 stand on their old runs. The peripheral owners' time seems to be at an end.

On 14. June the situation is the same, apart from the fact that no. 4 has disappeared, and nos. 3, 6 and 14 are not so faithful anymore. No. 12 and no. 15 are often seen fighting.

On 21. June no. 3 and no. 4 have disappeared. No. 6 often follows leaving reeves. No. 12 and no. 15 are often fighting.

The hierarchy on the "hill".

The hierarchy on the runs is partly to be seen from the way of occupation of which no. 4 and no. 15 make use. They start from the SW-run (in the case of no. 15 from a peripheral run), continue to the SE-run and finally, after violent fights, into the NE-run. The territorial fights seem mostly to depend on the superiority of the owner of the NE-run.

As soon as this owner enters into a period of uncertainty, the combativeness flares up. The occupations of the other runs do not seem to cause fights worth mentioning.

The run of no. 3, however, is difficult to place in the hierarchy. The small number of fights and the great number of copulations which occur there, seem in the opinion of SELOUS and of ANDERSEN (1951, p. 150) to place it on the top of the

“hill”. When we consider the faithfulness of the owners, no. 3 appears as the least faithful steady owner, while the NE-owner, is the most faithful one, especially during the time in which it is pressed. There is, however, no great difference in the absences from the “hill” of the steady owners, and an excessive faithfulness towards the run may be interpreted as a sign of uncertainty rather than of selfconfidence.

Thus the hierarchy of the central runs seems to be: The NW-run (with no. 3) as the supreme, untouchable, the NE-run (with nos. 2, 4 and 15) as the second highest and most desired run, and the SW-run (with nos. 1 and 12) as the third. The importance of the SE-run seems chiefly to depend on its strategical situation as a starting point for occupation of the NE-run.

It is impossible to divide the peripheral runs into groups, as the owners of these are neither implicated in territorial fights nor in copulations, apart from one exception. The behaviour of the unsteady owners appears altogether to be determined by the reeves more than by territorial considerations.

The individual owners.

The numeration corresponds to that used in fig. 1–6, and table I, to which we refer for Comparison.

No. 1 is an old acquaintance. First time it was caught was on 23. May 1948 on the same “hill” which we observed, and during the same spring it was caught again on that “hill” (ANDERSEN 1951, table 7). Undoubtedly it has been an owner. On 31. May 1950 it was recaptured on the same “hill”, and this year it certainly was a steady owner (BANCKE & MEESEN-BURG 1952, pp. 104–05).

In 1952 no. 1 was present as a steady owner from 19. April–24. May, but was, however, absent on 26. April, when no. 4 had occupied its run. During the rest of the time it stayed on no. 4’s original SW-run. Eventually driven away by no. 12 between 24. and 31. May. Relatively much implicated in quarrels during its whole period especially with nos. 2, 3 and 4. The reeves would often stay at its run, but copulations we observed only on 17. and 24. May (respectively a number

of 8 and 6). Further, no. 1 has been recaptured on 14. May 1953 at the same place. This year no. 1 was a steady owner again. Thus no. 1 has appeared as a steady owner in 1948, 1950, 1952 and 1953 on the same "hill". Most probably it has been a steady owner in the intervening years, too, and has thus been a member of the society during 6 years at least (all the years with the same colour in its plumage).

No. 2 appears as a steady owner on 19. April and 26. April, when it owns the important NE-run. Its position, however, seems to be very unstable, since on both days it is violently fighting the other owners, on 26. April especially with no. 4, particularly when the two birds arrive at the "hill" at the same time. It seems to be rather nervous on 26. April. On 3. May it is driven out into the "retreat-run", but still appears as a steady owner, except for long eating pauses and rather early departure from the "hill". Both on 19. April and 26. April the reeves prefer no. 2, and on 26. April it has 3 copulations out of 4 in all.

No. 3 is present as a steady owner from 19. April to 14. June on the same run (NW), so it is the most steady of all owners. During the periods in which the owner of the NE-run is uncertain, no. 3 is often seen in quarrels with it, but besides it is rather peaceful (except small quarrels with no. 1). Possibly it has the highest rank in the hierarchy. Copulations: 10. May: 6, 17. May: 1, 24. May: 7, 31. May: 4, 7. June: 1.

From 3. May the reeves will often stand at the run of no. 3.

In the last days of observation no. 3 is less faithful; on 7. June it often forages, and on 14. June it leaves the "hill" 3 times with reeves. In these days it is not at all implicated in fights.

No. 4 is present as a steady owner from 19. April to 31. May, and as an unsteady owner on 7. June. Together with no. 15 it is the most dynamic of all the owners we observed. Between 19. and 26. April it is promoted (after fights?) from the SW-run to the SE-run, where on 26. April it is in violent fights 19 times with no. 2, whose run it occupies before 3. May. On this date some fights of weak order occur, followed by four weeks' peace. On 31. May the position of no. 4 seems to be critical, and it fights many times again, especially with

whites and guests that certainly cannot threaten it. On 7. June it is driven out into the "retreat-run", where it pauses for three hours in the forenoon, leaves the "hill" with reeves and flies away early.

From 03.35-03.50 o'clock it is involved in several serious duels with no. 15, with the result that it must retreat every time. Copulations: 26. April: 1, 3. May: 1, 10. May: 2, 17. May: 8, 24. May: 2, 31. May: 1, 7. June: 2.

From 26. April-31. May the reeves will often stand at the run of no. 4. No. 5 is present as an unsteady owner on 10. May and 17. May, on the first date being the only unsteady one, on 17. May shared by three others. Owner of the "retreat-run". No fights, no copulations.

No. 6 is present as a steady owner from 10. May to 21. June, but both at the beginning (on 10. May) and at the end (on 14. June and 21. June) it is very much like the unsteady owners by its inclination to leave the "hill" with reeves. But even during these periods it is very constantly present on the "hill". During all its time it is most seldom implicated in fights, and in this conduct it is rather like the other peripheral owners. Copulations: 17. May: 1, 24. May: 1. From 10. May to 17. June the reeves and the whites will often stand at no. 6, especially in the first weeks.

No. 7 is present as an unsteady owner in the morning hours on 17. May. Away at 13.30 o'clock. No copulations.

No. 8 is present as a central, unsteady owner on 17. and 24. May. By its staying on the "hill", by a few quarrels with no. 4 and by its two copulations on 24. May it is mostly like the steady owners. On one occasion on 24. May it tries to occupy the run of no. 4, but is driven out immediately.

No. 9. Very short appearance as an unsteady owner in the morning hours on 17. May. No fights, no copulations.

No. 10 appeared as a very characteristic unsteady owner until 16 o'clock on 24. May on the "retreat-run". No fights, no copulations.

No. 11 is present as an unsteady owner on 24. May until 13 o'clock. 1 copulation, no fights.

No. 12 is present as a steady owner on 31. May-21. June on the SW-run, which it had eventually conquered from no. 1

between 24. and 31. May. A single fight took place during the first two days of observation, and during the last two days many fights occurred with no. 15. It dominated completely the life of the "hill" together with no. 15 on 14. June and 21. June. Copulations: 31. May: 2, 7. June: 1, 14. June: 5, 21. June: 3.

From 7.-21. June the reeves will often stand at the run of no. 12.

No. 13 is present as an unsteady owner on 31. May during the morning hours on the SE-run. After many fights no. 15 occupies its run. No copulations.

No. 14 is present as a steady owner 31. May to 14. June, but on the latter date it leaves the "hill" about 7 o'clock. On 31. May it stands on a peripheral run, on 7. and 14. June it stands on the SE-run, but without any ambitions. Few fights (2). No copulations.

No. 15 is present as an unsteady owner on 31. May on a peripheral run and on the SE-run, and as a steady owner during the last three days of observation.

It starts on 31. May on a peripheral run, and during the morning hours it conquers the SE-run from no. 13. In the course of the following week it conquers the important NE-run from no. 4. Violent fights take place with the defeated no. 4 from 03.35-03.50 o'clock on 7. June and frequent quarrels with no. 12 on 14. and 21. June. Together with no. 12 it is preferred by the reeves in the last three days of observation. Copulations: 7. June: 3, 14. June: 4, 21. June: 6.

Discussion.

The following deals with various problems discussed by ANDERSEN (1951) and further elucidated by us.

- (a) Are many ruffs captured a few times each and a few ruffs caught frequently?

ANDERSEN shows that a small number of ruffs are caught relatively many times (in 1948 on "hill" c 5 ruffs more than four times each), and a great number of ruffs are captured a few times (in 1948 on "hill" c 12 ruffs less than four times each, 9 of them only one time).

The few ruffs that are caught many times, are called dominants in accordance with SELOUS's observations, and the great number of ruffs that are caught relatively few times, are called non-dominants.

If we use ANDERSEN's designations for our material and take into consideration that his captures do not begin until 7. May, the following owners must be made dominants: nos. 1, 2, 3, 4, 6 and eventually 12 and 15, these being the steady owners, whereas the non-dominants must include: nos. 7, 8, 9, 10, 11, 13 and 14, being the unsteady owners with a short period of reign, and further must the whites be reckoned among the non-dominants.

On the other hand it is quite sure that guests do not, or at any rate most seldom, appear in ANDERSEN's material, since these individuals stand outside the "hill", where no snares are placed, and further, only rarely show any activity.

- (b) Do the dominants stay on the "hill" on those times of the day, when most ruffs leave it?

ANDERSEN shows that during the inactive period in the forenoon the dominants will more often be captured than the non-dominants.

Our material shows that the steady owners (the dominants) are present in the forenoon, too, apart from short foraging trips, while the unsteady owners and to a certain degree the whites primarily frequent the "hill" during the periods of activity.

- (c) Are the dominants present on the "hill's" throughout the season?

According to the observations of ANDERSEN the activity of the dominants decreases in the course of the season and usually vanishes during the last weeks. Our observations show that the first arriving ruffs which undoubtedly were owners the previous year (ANDERSEN, MELLQUIST, SELOUS, BANCKE & MEESENBURG) after some weeks' quarrels have established themselves at the beginning of May, and that they occupy their runs during the whole month, after which they gradually are replaced by new (younger?) owners, which

continue to the end of the season. A single steady owner (no. 6) appears on 10. May and keeps its run to the last day of observation (cf. fig. 5).

(d) Does the same ruff visit two neighbouring "hill"s?

ANDERSEN has not captured the same ruff on more than one "hill", apart from one example. This exception on 13. May 1947 at 5.20 o'clock was caught on "hill" c and on 9. May 1948 at 4.00 o'clock on "hill" b. The conclusion is that a ruff will not visit more than one "hill" in the same season. As already mentioned ANDERSEN's captures only include the steady and the unsteady owners and the whites, whereas captures of guests must be exceptions. As far as the steady owners are concerned, they are so intimately bound to their runs that departure from the "hill" as a rule will only take place in connection with foraging. The unsteady owners and the whites, characterised by a relatively short and lax connection with the "hill", probably may visit more than one "hill", and ANDERSEN's example mentioned above certainly belongs to this category.

This problem was not closely examined until May 1953. At that time contemporary observations were made of two "hill"s, situated near each other. The observers at the two "hill"s were in connection with each other by radio communication, and each of them could survey the area between the two "hill"s.

The result was that if one of the owners would leave its own "hill", it never appeared on the neighbouring "hill". The guests, however, visited both "hill"s, and the same guests acted on both "hill"s in the way characteristic for guests. The whites visited both "hill"s, too, especially when reeves were present on these "hill"s, and the same whites acted on both places in the way characteristic for whites.

Seasonal variation.

All three columns of "activity" in fig. 7, in spite of certain anomalies demonstrate an increasing activity from the beginning of the season, culminating in the middle of May, and then a decrease, until finally the activity stops about the

Average duration of
visits (in minutes).
Refers to curves.

*Besøgenes gennemsnitlige
varighed (i minutter).
Refererer til kurverne.*

Number of visits.
Refers to columns.

*Antal besøg.
Refererer til søjlerne.*

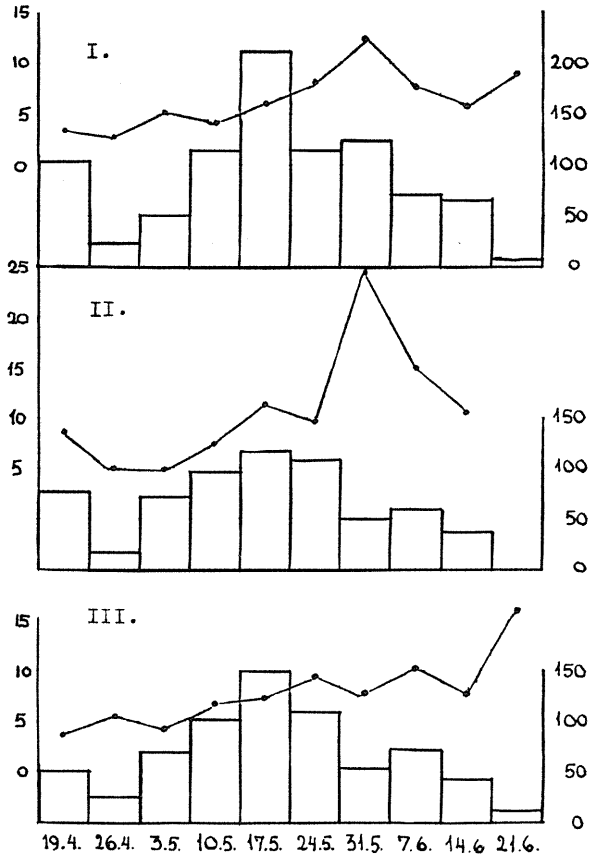


Fig. 7. Diagrams of activity showing the seasonal variation of guests, whites and reeves. Columns show number of visits, curves show duration of visiting time. The dates are given below.

I. Guests. II. Whites. III. Reeves.

Fig. 7. Aktivitetsdiagrammer over sæsonvariationen hos gæster, hvide og hunner. Søjlerne viser antallet af besøg, kurverne viser varigheden af besøgene.

I. Gæster. II. Hvide. III. Hunner.

20th of June. This increase and decrease is most distinct in the guests and the reeves, while the diagrams for the visits of the whites do not show such a distinct maximum. The reason for this is that the whites are so closely connected with the "hill" that they will visit it outside the periods of activity.

The anomalies in the increase and the decrease of the activity may possibly be explained as follows:

(1) The great accumulation of visiting birds on 19. April is possibly a result of the fact that northward migrating birds take part in the play.

(2) The decrease in the number of the visits on 26. April is undoubtedly due to the Common Gulls that disturbed the play all the day.

(3) The relatively small number of visits on 31. May is among other things due to the observer, who on this day did all the work himself and slept one hour during the morning activity.

(4) Maybe the high wind on 24. May influenced the decrease of the activity from 17.-24. May.

Our activity-columns agree exactly with those of ANDERSEN (1951) and support his results as far as the first weeks of the season are concerned. The curves giving average duration of visiting time, for guests and whites show a certain accordance, but the visiting hours of the whites usually last twice as long as those of the guests this indicating closer connection with the "hill". The curves reach a peak on 31. May. The curve for the reeves, however, shows a continued increase in visiting hours just to the end of the season. This disagrees with the theory that it should be breeding birds that at the end of the season should form the essential part of the visiting reeves (ANDERSEN 1951, p. 152).

There is usually a distinct morning-maximum in the daily activity on the "hill" (see ANDERSEN 1951 and BANCHE & MEESENBERG 1952, table I). The visit-numbers for the individual days, however, show that the morning activity at the beginning is twice as great as the afternoon activity, and gradually decreases, until on 31. May it is equal to and on 7. June even less than the afternoon activity (table II).

TABLE I.

The table shows with whom the owners leave the "hill". The individuals with whom they leave are divided into the following groups. The owner leaves:

- A. alone or with other owners.
- B. with *reeves* (and sometimes whites and/or guests).
- C. with whites and/or guests.
- D. with other owners, *reeves* (and evt. whites and/or guests).
- E. with other owners, whites and/or guests.
- F. with passing flocks (and evt. other owners).

The figures represent the number of times the owner left the "hill" with the group in question.

Tabellen viser med hvem ejerne forlader skoggerpladsen. Ledsagerne inddeles i 6 nedenstående grupper. Ejerne forlader pladsen:

- A. alene eller med andre ejere.
- B. med hunner (og evt. hvide og/jeller gæster).
- C. med hvide og/jeller gæster.
- D. med andre ejere, hunner (og evt. hvide og/jeller gæster).
- E. med andre ejere, hvide og/jeller gæster.
- F. med passende flokke (og evt. andre ejere).

Tallene angiver, hvor mange gange ejeren har forladt pladsen med de pågældende grupper.

Date Dato	Owner no. Ejer nr.	A	B	C	D	E	F	Date Dato	Owner no. Ejer nr.	A	B	C	D	E	F
19. April	1	7	..	1	7	2	3	24. May	1	25	1	6	3	1	..
	2	7	..	..	6	2	2		3	23	1	6	3	1	..
	3	7	..	..	7	2	2		4	26	1	6	3	1	..
	4	9	1	2	7	2	3		6	26	1	4	3	1	..
26. April	2	10	..	..	..	..	1	8	14	2	3	1	..	..
	3	12	2	1	..	..	3	10	12	11	1	1	1	..	
	4	27	..	..	..	..	1	11	8	4	..	..	..	..
3. May	1	9	1	..	..	..	2	31. May	3	9	1	2	1	..	..
	2	4	1	1	..	..	2		4	13	..	1	1	..	..
	3	6	1	1	..	..	2		6	9	1	2	1	..	..
	4	11	..	..	..	..	1		12	11	..	3	1	..	..
10. May	1	15	..	..	2	..	..	7. June	3	18	..	2	..	..	..
	3	19	..	1	2	..	..		4	11	4	..	..	..	..
	4	20	..	..	2	..	..		6	21	1	6	..	..	..
	5	6	10	1	2	..	..		12	12	..	1	..	..	..
	6	10	2	..	2	..	..		14	5	..	1	..	..	..
17. May	1	12	1	1	..	..	..	14. June	3	47	3	1	..	..	..
	3	15	1	1	..	..	..		6	33	13	1	..	..	..
	4	20	..	2	..	..	..		12	50	1	..	..	..	..
	5	2	7	2	..	..	..		14	1	..	1	..	..	..
	6	9	1	1	..	..	..	15	43	1	2	..	..	..
	7	2	3	..	..	..	..	21. June	6	37	5	2	1	..	..
	8	3	4	..	..	..	..		12	46	..	2	1	..	..
9	1	..	1	..	..	..	15		36	1	1	1	..	..

TABLE II.

Number of visiting guests, whites and reeves. The observation time (0200–2200 o'clock) is divided into 12 periods of 100 minutes each, and the number of visiting birds is stated for each of these periods. Italicized numbers indicate maximum activity.

Antal besøgende gæster, hvide og hunner. Døgnet er delt i 12 perioder à 100 minutter, og antallet af besøgende fugle er angivet for hver af disse perioder. Kursivering angiver maksimal aktivitet.

Date <i>Dato</i>	0200– 0340	0340– 0520	0520– 0700	0700– 0840	0840– 1020	1020– 1200	1200– 1340	1340– 1520	1520– 1700	1700– 1840	1840– 2020	2020– 2200	Total
Guests (<i>Gæster</i>)													
19. April . . .	..	4	28	<i>32</i>	4	1	1	3	<i>19</i>	<i>12</i>	..	..	104
26. – . . .	..	2	6	2	6	2	..	2	2	2	..	..	24
3. May . . .	..	6	<i>14</i>	<i>13</i>	3	..	1	..	8	6	..	..	51
10. – . . .	..	15	<i>21</i>	<i>20</i>	13	5	4	<i>20</i>	10	8	..	..	116
17. – . . .	8	<i>63</i>	31	16	3	10	11	9	<i>24</i>	<i>31</i>	6	..	<i>212</i>
24. – . . .	9	<i>16</i>	12	13	10	9	5	6	8	<i>22</i>	5	..	115
31. – . . .	5	<i>24</i>	5	<i>15</i>	9	3	9	6	<i>18</i>	<i>20</i>	8	1	123
7. June . . .	2	<i>16</i>	6	..	5	2	4	6	<i>16</i>	9	5	..	71
14. – . . .	..	<i>15</i>	<i>12</i>	2	3	1	2	7	5	<i>12</i>	..	4	63
21. – . . .	1	1	<i>4</i>	1	1	..	..	..	..	..	..	..	8
Whites (<i>Hvide</i>)													
19. April . . .	..	5	<i>18</i>	<i>12</i>	3	..	2	9	<i>23</i>	6	..	..	78
26. – . . .	..	4	2	4	2	1	..	3	..	2	..	..	18
3. May . . .	..	9	<i>10</i>	<i>12</i>	4	6	10	3	8	11	..	..	73
10. – . . .	..	<i>15</i>	11	<i>17</i>	11	9	9	10	4	9	2	..	97
17. – . . .	1	<i>16</i>	12	11	9	11	13	10	14	15	5	..	<i>117</i>
24. – . . .	3	11	11	14	8	11	7	13	11	13	5	..	107
31. – . . .	4	4	3	4	5	4	5	8	6	6	2	..	51
7. June . . .	..	6	9	5	..	1	9	5	6	<i>14</i>	4	..	59
14. – . . .	2	5	<i>11</i>	4	1	..	1	3	4	4	1	1	37
21. – . . .	..	..	..	..	..	..	..	..	..	..	..	..	0
Reeves (<i>Hunner</i>)													
19. April . . .	..	2	<i>22</i>	11	1	..	2	..	8	5	..	..	51
26. – . . .	..	4	2	6	4	..	1	..	2	7	..	..	26
3. May . . .	..	9	<i>15</i>	<i>13</i>	3	2	3	2	<i>10</i>	<i>12</i>	1	..	70
10. – . . .	..	9	<i>22</i>	<i>17</i>	8	6	5	<i>20</i>	6	8	1	..	102
17. – . . .	..	<i>35</i>	19	<i>17</i>	4	9	13	7	<i>23</i>	<i>18</i>	5	..	<i>150</i>
24. – . . .	3	<i>19</i>	9	<i>16</i>	8	10	9	8	2	<i>21</i>	4	..	109
31. – . . .	5	<i>11</i>	2	3	6	1	2	2	6	<i>11</i>	5	..	54
7. June . . .	2	<i>12</i>	9	4	4	2	<i>12</i>	6	8	<i>13</i>	2	..	74
14. – . . .	..	<i>12</i>	9	1	5	..	..	4	3	6	3	1	44
21. – . . .	3	..	3	1	1	1	2	..	..	1	..	..	12

DANSK RESUMÉ

En undersøgelse af Brushanens (*Philomachus pugnax* (L.)) parringsspil. II.

Denne artikel bygger på 10 døgn kontinuerlige iagttagelser af en af reservatet Tippeternes skoggerpladser i sommeren 1952, hver lørdag fra 19/4–21/6. Skoggerpladsen og arbejdsmetoden er den samme, som omtales i vort tidligere arbejde om brushønsene (BANCKE & MEESENBURG 1952).

Inddelingen af de hanner, der fandtes på eller i tilknytning til skoggerpladsen, er den samme som i 1950, men da vore nye iagttagelser har gjort en yderligere differentiering nødvendig, bringes inddelingen her i sin udvidede form:

Ved *ejere* forstår vi de hanner, der har et bestemt ståsted på skoggerpladsen. Ejerne underafdeles i de *faste* ejere, der trofast opholder sig på skoggerpladsen dagen igennem og ikke forlader denne med bortflyvende hunner, og de *løse* ejere, der som regel kun er på skoggerpladsen i aktivitetsperioderne, og som forlader pladsen med bortflyvende hunner (se fig. 1–4 og tabel I).

Ved *hvide* forstår vi hanner med hvid krave og øretoppe. Disse har lov til at komme ind på skoggerpladsen, men har intet ståsted på denne og deltager ikke i de territoriale kampe.

Ved *gæster* forstår vi de hanner, der ikke har lov til at komme ind på skoggerpladsen.

Ejerne. På fig. 6 vises ejernes placering på skoggerpladsen og deres territoriale kampe i løbet af sæsonen. Det fremgår heraf, at sæsonen kan deles i tre hovedperioder:

1. En stridbar indledning, under hvilken de først ankomne ejere (gamle hanner) efterhånden etableres efter styrkeforhold. I denne periode forlader ejerne ofte skoggerpladsen for at slutte sig til flokke, der passerer eller forlader pladsen (træksammenhold). Ejerne er i denne periode, der omfatter sidste halvdel af april, ganske overvejende faste og centrale ejere.

2. Efter at det første ejerhold har afsluttet sine rangfordelingskampe, følger en ret fredelig periode, der strækker sig over det meste af maj måned (højsæsonen). I dette tidsrum optræder de løse ejere. Disse må opfattes som gæster, der på grund af de faste ejeres overlegenhed og dermed følgende tolerance etablerer sig midlertidig på ståsteder i kanten af pladsen. De løses ejerforhold er som regel kortvarigt, og de deltager yderst sjældent i kampe og parring.

3. Omkring 1. juni afløses det første ejerhold under hårde kampe af det andet, således at de fleste centrale pladser skifter ejere. Selv efter at det nye ejerhold har etableret sig, fortsætter stridighederne mellem disse indbyrdes resten af sæsonen. Løse, perifere ejere mangler i denne periode. Aktiviteten stærkt aftagende. De enkelte ejeres pladsperiode og deres inddeling i løse og faste ejere fremgår af fig. 5.

Rangfølgen fremgår tildels af nr. 4 og nr. 15's erobningsveje:

Start på SV-plads eller perifer plads, erobring af SØ-plads, derefter erobring af NØ-plads. NV-pladsen, der hele sæsonen er besat af nr. 3, synes at være uden for det hele. Nr. 3 kæmper mindst og parres mest, hvilket efter ANDERSEN (1951) og SELOUS skulle placere den øverst i samfundet.

Ståstedernes rangfølge synes altså at være: NV, NØ, SV mens SØ-pladsens værdi sikkert hovedsagelig ligger i dens strategiske beliggenhed ved erobring af NØ-pladsen. De perifere ejere synes at stå uden for denne rangordning.

Ved samtidig observation af to skoggerpladser viste det sig, at faste ejere aldrig besøger andre skoggerpladser, at gæster optræder som gæster ved begge skoggerpladser og at hvide optræder på den for hvide karakteristiske måde på begge skoggerpladser.

Sæsonvariationen er vist i fig. 7. Det fremgår af denne, at aktiviteten er stigende midt i maj måned for derefter at aftage til Sankt Hans. Vore oplysninger kompletterer således ANDERSENS kurver over sæsonvariationen (1951).

Hvad variationen i den daglige aktivitet angår, vises det, at der i overensstemmelse med ANDERSEN (1951) og BANCKE & MEESENBERG (1952) er et morgen- og et eftermiddagsmaksimum, og at eftermiddagsmaksimet i løbet af sæsonen tiltager i betydning i forhold til morgenmaksimet (se tabel II).

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