The Calls of the Chaffinch (*Fringilla coelebs* L.) in Denmark.

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(Med et dansk resumé: De danske Bogfinkers (*Fringilla coelebs* L.) stemmer).

Hertil Tavle III–VI.

Recently it has become possible to describe the sounds of birds objectively as they can be recorded on a magnetic tape and analyzed on a sound spectrograph. This method has already been used by Bailey (1950), Borror and Reese (1953), Collias & Joos (1953), Thorpe (1954), Marler (1955, 1956a) and others. Such sound spectrograms or sonograms render a picture of the sounds which supplies a form of notation as well as a method of precise measurement. The sonograms show frequency in kilocycles per second on the vertical scale, and time in seconds on the horizontal scale, and variations in intensity appear as corresponding variations in the darkness of the mark produced.

In the present study observations on the sounds of the Chaffinch were made at Copenhagen on wild birds and on captive birds, some of which were reared in isolation from other Chaffinches from an age of 5 days. Recordings were made from captive birds in indoor cages on an "Eltra" tape recorder with a tape speed of 19 cm.s per second and from wild birds on a portable "Maihak" recorder with a microphone placed in a parabolic reflector. The recorders were provided through a grant from the Danish State Research Foundation. The tape recordings were analyzed on a "Sonagraph" (manufactured by Kay Electric Co.) at the Experimental Phonetics Laboratory, Copenhagen and I am greatly indebted to Dr. Sv. Smith for his help and advice. The sonograms were made by the narrow band filter (45 Hz) and some of them are given on plates III–VI.

The calls of the Chaffinch have already been studied thoroughly by Marler (1956a and b) who worked with the British Chaffinch (*Fringilla coelebs gengleri*). The present investigation of the Continental Chaffinch (*Fringilla coelebs coelebs*) shows that its calls are very similar to those of the British Chaffinch.

Therefore MARLER's verbal representations of the calls are applied.

In table III is given an inventory of the calls.

The vocabulary.

1. The flight call.

This is a short note: *tsup*. It consists of a downward inflected note usually accompanied by a higher harmonic (see plate IIIa).

It is rendered by flying Chaffinches and by birds just before taking wing, but not when they are fleeing from a sudden strong danger. The flight call is mostly associated with a tendency to fly that results from internal changes as MARLER (1956a) says. The call is heard both singly and in successions. It is also given by caged Chaffinches placed outside when they see Chaffinches flying over and when they are hopping to and from when in flying mood.

2. The social and alarm call.

This is the most common and characteristic call of the Chaffinch. It is a clear short *chink* consisting of about three simultaneous notes rising sharply in pitch, the lowest of them continuing in a short, steady note (see plate IIIb). This call is given in many different situations. As a social call when a Chaffinch is alone it is uttered both singly and doubled, for instance it is often to be heard when a caged bird is placed outdoors, another bird answers and sometimes approaches. As an alarm call it is given in rapidly repeated groups of 1–6, rarely more (HINDE 1954), when a Chaffinch is exposed to danger, for instance by a perched predator or by predators and smaller birds near the nest. In such cases other Chaffinches reply and approach and adopt mobbing behaviour hopping to and fro with raised crest, pivoting movements of the body and tail-flipping. Other species also react to the mobbing call and Chaffinches react to the mobbing calls of other species. Thus both the social form and the alarm form attract other Chaffinches to the caller. MARLER (l. c.) further distinguishes some other types of the *chink* call: an escape form and an agressive form which do not attract recipients. As MARLER (l. c.) points out the motivation of the

chink call is very complex. But perhaps, there are three similar calls working as different signals each linked with a special tendency.

The *chink* call is heard both from males and females throughout the year but much more often in the breeding season, which tends to show that it depends both on external and internal factors.

3. The injury call.

MARLER (l. c.) states a squeak similar to the *seee* alarm call (see p. 92) given by Chaffinches which are injured in fighting. I have never been fortunate enough to hear it or to record it.

4. The aggressive call.

This call MARLER (l. c.) states only to have heard from captive males when fighting, while in all his other observations only the *chink* call was used.

I have not heard this call being used in fighting, but only from males and females attacking birds close to the nest. The Chaffinch shows mobbing behaviour towards predators and occasionally incipient attacks on them (HINDE 1954), and stuffed birds near the nest are usually attacked, *e. g.* Cuckoo (*Cuculus canorus*) EDWARDS, HOSKING & SMITH (1949) and Jay (*Garrulus glandarius*) GOODWIN (1953). When I placed stuffed birds as Little Owl (*Athene noctua*), Magpie (*Pica pica*), Sparrow Hawk (*Accipiter nisus*), Cuckoo (*Cuculus canorus*), Fieldfare (*Turdus pilaris*) and Chaffinch near a nest, both the female and the male showed mobbing behaviour, using the *chink* call. They also showed the aggressive head-forward posture with spread tail uttering the aggressive call: a buzzing note rendered as *zzzzz*, and often attacked the bird pecking furiously at it. Other Chaffinches were attracted by this call and were giving the *chink* call. In natural situations in the field I had only heard this call rarely until I began experiments with stuffed birds at Chaffinch nests. I have heard it from both males and females attacking and chasing a Cuckoo, and therefore, at first, I thought it might be a special reaction to the Cuckoo.

Sonograms of records from attacks on stuffed birds (see

plate IIIc & d) show that this call consists of a very rapid oscillation within a wide band of frequencies. These brief notes are hardly detectable on the graph. But by making the sonogram at a higher speed the graph is streched out and shows more clearly the structure of the call.

5. The *seee* alarm call.

This is a high faint squeak which is not easy to notice. It is a pure outdrawn tone of a high frequency falling slightly in pitch (see plate IIIj). I have heard a very similar call from Robin (*Erithacus rubecula*), Blackbird (*Turdus merula*) and Great Tit (*Parus major*), and MARLER (1956a) states the same also for Blue Tit (*Parus caeruleus*), Wren (*Troglodytes troglodytes*) and Reed Bunting (*Emberiza schoeniclus*), and he has found that these calls are difficult to locate in contrast to the *chink* alarm call and the mobbing calls of the above mentioned species, which are easily located.

This call is only heard from males in the breeding time associated with an escape tendency when a hawk or other birds, for instance a Magpie, are flying over, but it is also evoked by ground predators. Captive males give the same call when hearing the Blackbird's alarm call.

The caller crouches, and other Chaffinches who have heard it fly to cover. This was observed both in wild and captive birds. I have also heard it from captive males just after copulation. Further I have heard it from males seeing other males (cf. BERGMAN 1953), for instance a captive male the cage of which was placed in a male's territory.

6. The *huit* alarm call.

This call is a loud whistle consisting of a note rising in pitch, which may have an upper harmonic (see plate IIIe).

It is very often heard from the male in the breeding time. Therefore it is wellknown by bird watchers together with the flight call, the *chink* call, and the song. These four calls are the most characteristic calls of the Chaffinch. It is very often given in long series for hours about 30 times a minute, but I have heard up to 50 per minute.

In Denmark it is commonly believed that this call means that rain is coming and it is therefore called rain-call. It is

given only by the male in the breeding time in rather different situations (cf. SICK 1939). Just like MARLER (l. c.) I have heard it in danger situations and in courtship. MARLER therefore concludes that this call is connected with an escape tendency except sometimes when it occurs spontaneously especially late in the breeding season. I have heard it very often during the whole breeding time in situations in which it seems impossible to detect any motivation, for instance when males are feeding on the ground or when preening. I have heard it given spontaneously from captive males in situations in which there were no changes in the environment. In many cases it seems as if this call is uttered when the song motivation is low or the song is inhibited (see also BERGMAN 1953).

It is often accompanied with the *chink* call when a danger appears, and with the *seee* call when a bird of prey flies over and the song is inhibited. I have also heard captive males just after copulation giving weak *huit* calls. It is difficult to detect any function of this call except that other Chaffinches reply with the same call.

It varies greatly and there are dialects of this call even within small areas; see for instance SICK (1939, 1950) for Germany, and MARLER & BOATMAN (1950) for Britain and the Azores. In Denmark where there are no drastic geographic barriers I have found a number of dialects. Round Copenhagen this call is a soft note very much like the alarm call of the Redstart (*Phoenicurus phoenicurus*) rendered as *huit*. About 50 km.s farther west, in the central part of Zealand it is a disyllabic *hrit hrit*. On the isle of Funen and in East-Jutland it is a mono-syllabic *hrit*; the individual birds have both *huit* and *hrit*, and these two notes are often combined in different ways, for instance: *hrit, huit huit*. On the island Bornholm the birds have a disyllabic *it it* or sometimes three-syllabic *it, it, it*. The sonogram in plate IIIg reveals that each of the double notes are rising in pitch similar to the *huit* call. In plate IIIf is a sonogram of the *hrit* of a Scandinavian Chaffinch. The sonogram shows a note of about the same pitch as the *huit*, but it oscillates rapidly. More study of the occurrence of these call variants is needed.

7. Song.

The male Chaffinches in Denmark begin to sing about the middle of February, depending on the weather, and regular full song is often heard in late February and the beginning of March. The birds gradually stop singing in late July. In September a soft subsong is to be heard from both juveniles and adults. Subsong is low motivation song given by both young and old males especially at the beginning and at the end of the season when the tendency to sing is low. I have heard captive juveniles chirping and warbling already at the age of about one month. It is a series of more or less amorphous chirping notes fluctuating in pitch (see plate Vb). Sometimes *chink* calls are inserted.

The subsong in spring is similar to the autumn song but a low-pitched rattle is now inserted more and more regularly. Chirps and rattles are grouped in various ways but gradually the subsong becomes more regular being a sequence of chirps followed by a rattle. The chirps are very similar to the *tchirp* call (see p. 97) but are often more outdrawn. They consist of one or more upward-inflected notes followed by notes which oscillate rapidly over a wide range of frequency sometimes with simultaneous notes of a lower frequency. The rattles just as in the song in courtship (see plate VIa) consist of a series of exploding sounds grouped in pairs of which the first note is of a higher frequency than the other. This is clearly seen by making the sonogram at a higher speed so that the graph is streched out. Sometimes the subsong is mixed with other calls especially the *chink* call and as stated by MARLER (l. c.) also *seee* and *huit* calls. THORPE (1955) has also recorded imitations of other species in the subsong. Both old and young birds use subsong when they enter their territories, but the old males change to full song earlier than the young birds (cf. MARLER 1956a and b).

I have never heard song from females in the wild, but according to several authors the female occasionally gives song (MARLER 1956a and b). A female treated with male sex hormone gave some subsong (POULSEN 1951).

Captive birds which are kept in rather dark rooms and newly caught shy males in which song is inhibited utter the

subsong for a much longer period than other individuals. They sing the full song, however, when they are placed in an outside aviary. In captive birds the subsong seems to appear spontaneously while the bird is sitting still or while feeding or preening but perhaps it is also evoked by the song of other birds. Captive males which are placed in a territory of a wild male begin to sing the subdued subsong when the owner of the territory begins to sing, attracted by the song of the strange male. No reactions to subsong have been observed and presumably it has no function (cf. MARLER 1956a).

As already mentioned the subsong begins in mild winters in the middle of February. In the course of 5–15 days it develops into the full song, but much depends on the weather. In severe weather such as snow, fog, wind etc. no song is heard. Especially in sunshine much song is to be heard (cf. BERGMAN 1953). In the beginning song is mostly heard in the morning. During the first days after singing has begun the song is incomplete. It is softer and shorter than the normal song. Often the notes tumble out and the terminal flourish and some of the trill are often lacking. When the full song has commenced, subsong, however, is sometimes interspersed.

The typical song has a stereotyped pattern and lasts for 2 or 3 seconds. It is given at an average rate of 6.6 per minute (MARLER 1956a). The rate of song delivery varies during the day and depends on the weather (KLOCKARS 1941). Weather also influences the start of dawn song (HAARTMAN 1952 and others). The song consists of rapid trills stepwise falling in pitch and ending in a terminal flourish consisting of more emphatic notes. The sonogram (see plate IVa, b, c) gives a clear and characteristic picture of the song. By means of such sonograms of many songs THORPE (1954) has analyzed the song and has found that it consists of three phrases.

Chaffinch song varies much even if these variations are of a subtle character and can only be recognized by experts, preferably by the aid of sonograms. There is much individual variation, and each bird may have up to six songs (average 2.3 songs) according to MARLER (l. c.). Greater differences occur in Chaffinches from different areas. In such cases song dialects occur. Such geographic variations have been studied by MARLER (1952).

In Denmark I have recorded several song dialects, the most characteristic one being that of the Chaffinches of the island of Bornholm in the Baltic. This population also has a variant of the *huit* call. The song of these Chaffinches is shorter, and especially the end-phrase is short and simple (see plate IVb). At the same area was heard a song variant which I have heard at several places in Scandinavia. It consists of an abrupt *chick* almost exactly like that of the Great Spotted Woodpecker (*Dendrocopos major*) added to the song after a perceptible pause (see plate IVc).

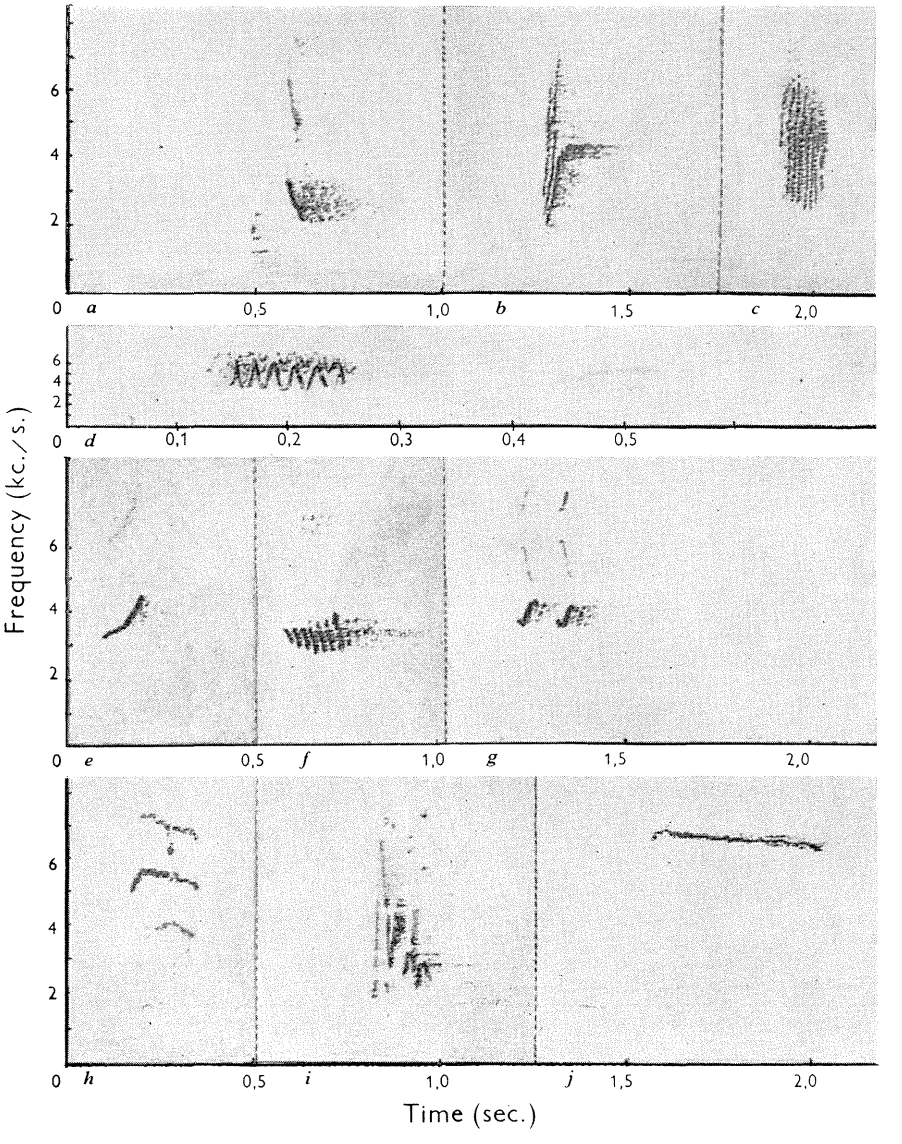
A compressed version of the song is heard from males in intense courtship and in copulation. This song consists of a continuous sequence of brief compressed songs often with repeated end-phrases, sometimes interspersed with subsong: chirps and rattles (see plate VIa). It is given softly and the different elements are rapidly repeated. The chirps are often outdrawn and both the chirps and the rattles are also given alone.

The birds sing from certain songposts on high perches, whereas subsong is given mostly from low perches in dense cover (cf. MARLER 1956b, and BERGMAN 1953).

Males often counter-sing and both in captive and wild birds singing is evoked by song from a loudspeaker, but it also occurs spontaneously.

It has often been stated that song attracts females and repels males. When playing tape-recordings of song for Chaffinches in the field I have been able to study the effect on males but not on females. When the loud-speaker was placed outside the territory of a male it began counter-singing and when it was placed inside its territory it was not only counter-singing, but also approached to a distance of about 2 m, looking about. The same was the case when I used a captive male in a covered cage. A bird in a uncovered cage would not sing when its cage had been moved to another place until after some time. The bird in the covered cage stopped singing when the owner of the territory was singing intensively nearby. When I placed some stuffed birds, such as Greenfinch (*Chloris chloris*), Brambling (*Fringilla montifringilla*) and a male and a female Chaffinch near the loud-speaker or the

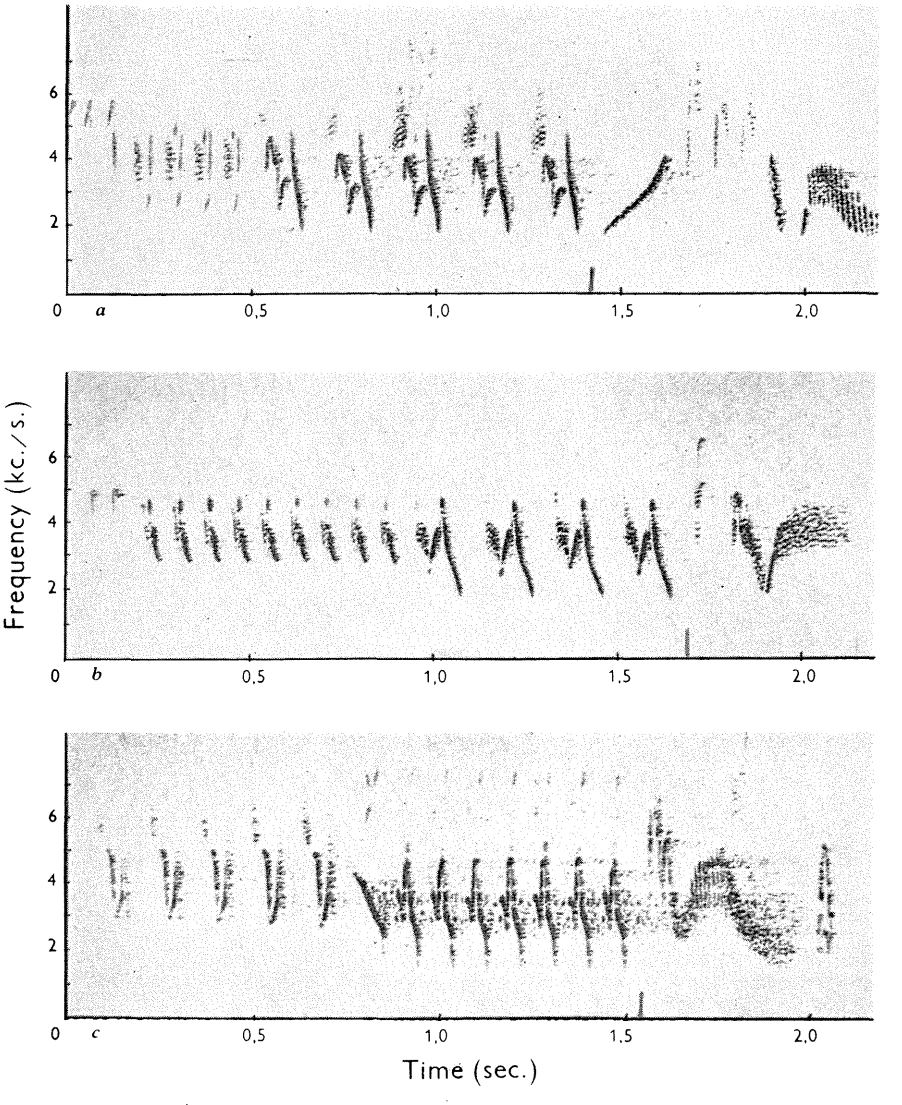
TAVLE III.



a: *tsup* flight call. b: *chink* social and alarm call. c: *zzzz* aggressive call. d: the same call (this graph is made by a higher speed and shows that the call consists of a rapid oscillating note). e: *huit* alarm call. f: *hrit* from a Scandinavian Chaffinch. g: *it it* from a bird from Bornholm (f and g are variants of e). h: *kseep* courtship call. i: *tchirp* courtship call. j: *seee* alarm call.

a: flugtstemmen jyb. *b: lokke- og farestemmen* pink. *c: angrebsstemmen* zzzz. *d: den samme lyd som c men sonogrammet er lavet med større hastighed, så at man kan se, at denne stemme består af en hurtig trille. e: regnvejrsstemmen* uit. *f:* ryt *fra en skandinavisk Bogfinke. g:* it *fra en bornholmsk Bogfinke (f og g er varianter af e). h: parringsstemmen* tsi. *i: parringsstemmen* tsje. *j: farestemmen* tii.

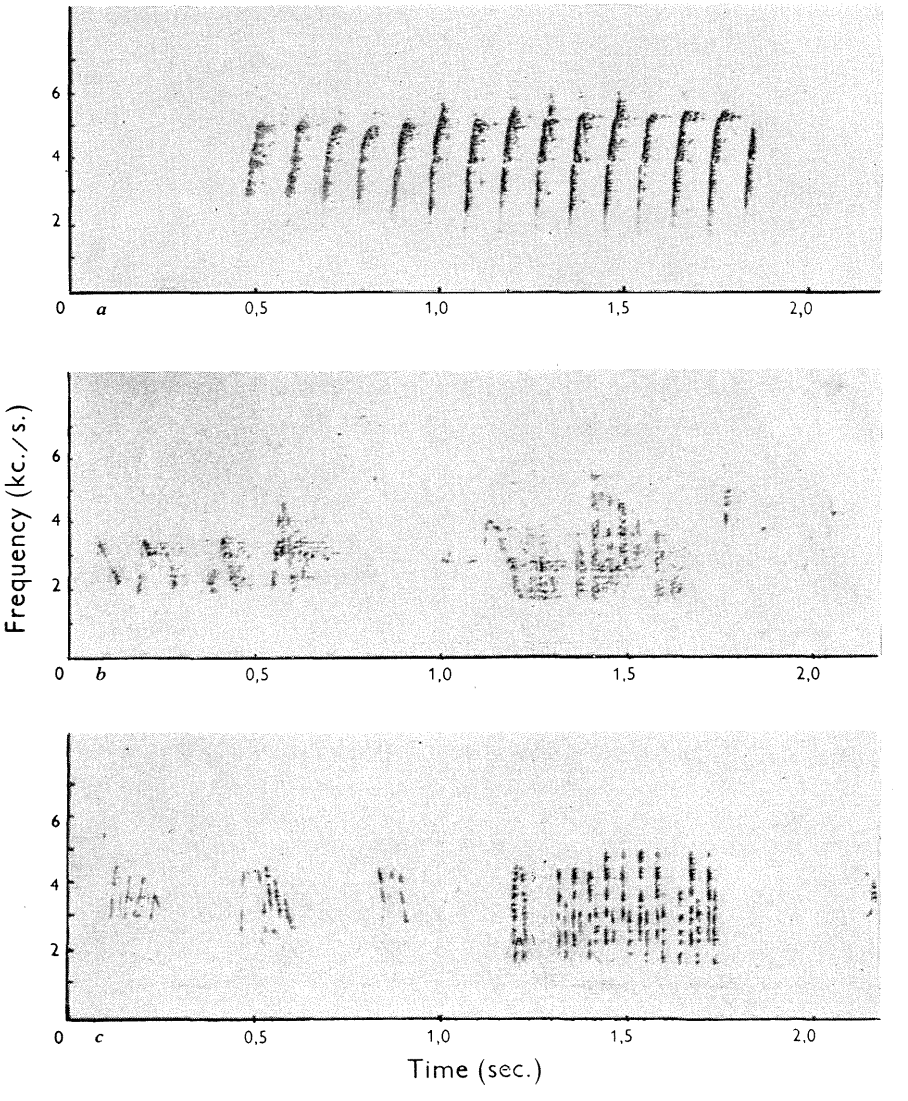
TAVLE IV.



Song consists of trills stepwise falling in mean pitch (3 steps in a and b, 2 in c) followed by an end-phrase beginning at the mark. a: bird from Copenhagen. b: bird from Bornholm (note short end-phrase). c: Scandinavian bird (note short note following end-phrase).

Sangen består af triller, der falder i tonehøjde (der er tre trin i a og b og to i c) efterfulgt af »slaget«, der begynder ved mærket. a: han fra København. b: han fra Bornholm) bemærk kort »slag«). c: skandinavisk Bogfinke (bemærk den korte lyd efter »slaget«).

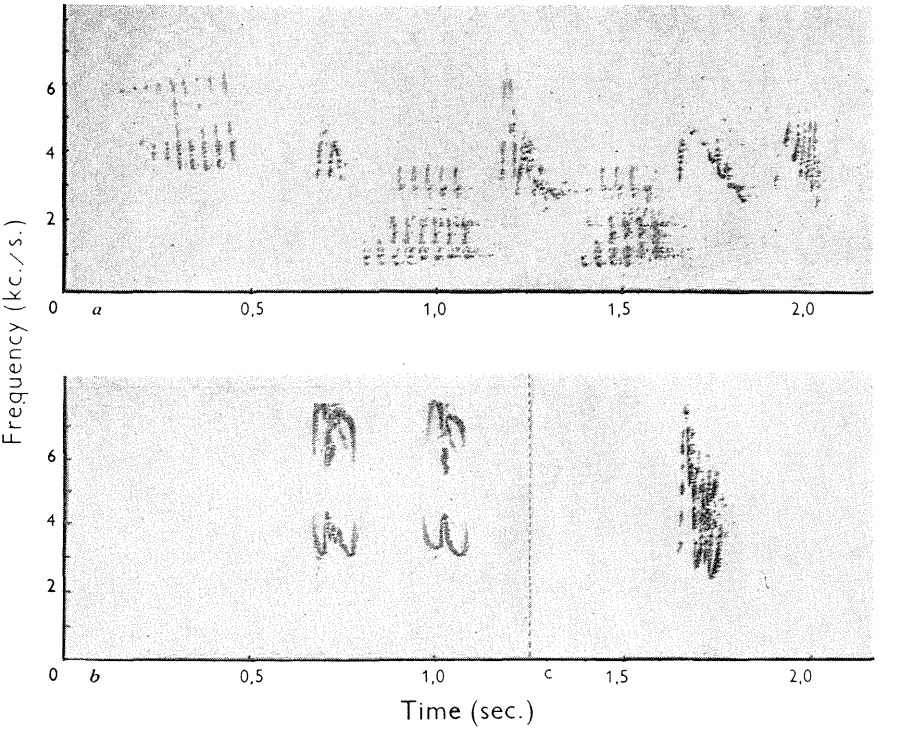
TAVLE V.



a: Innate song of an one year old male reared in isolation from 5 days of age. b: subsong of a young male about 1 month old. c: spring subsong of an old male consisting of some chirps and a rattle.

a: medfødt sang af en etårs han opfostret i fangenskab uden at kunne høre andre bogfinker fra den var 5 dage gammel. b: svag kvidrende sang af en ung han ca. 1 måned gammel. c: svag kvidrende sang af en gammel han om foråret bestående af nogle tjse *lyde og en* trrr *lyd.*

TAVLE VI.



a: some chirps and two rattles (the calls of the low frequency) from song of male at courtship. b: begging call of nestlings. c: begging call of fledglings.

a: nogle tjse *lyde og to* trrr *lyde (de dybeste lyde) fra hannens sang ved parringen. b: redeungernes fodringsstemme. c: de udfløjne ungers fodringsstemme.*

cage, the wild bird would at once swoop down on the stuffed male Chaffinch and peck at it so that it fell down. From a distance the wild male was attracted by the song of the other male, but nearby it located the other bird by its appearance.

As mentioned already song is evoked by external stimuli, such as the presence of a rival male or its song, and is connected with an aggressive tendency. Sexual stimuli on the other hand inhibit song except at copulation. A captive male for instance stops singing when seeing a female in another cage and gives the *kseep* courtship call, and in wild birds song becomes much less common after pair formation. Song also depends on internal factors. In males treated with male sex hormone singing is induced (COLLARD & GREVENDAHL 1946, POULSEN 1951). Male hormone, consequently, is one of the internal factors governing the song.

8. The *kseep* courtship call.

This is a short and high-pitched call of the male at pair formation. It is also heard when a male follows the female at the beginning of the season and when a male chases a rival. It consists of 3 simultaneous notes which are falling in pitch, beginning and ending abruptly. The middle one is the most emphatic note (see plate III h).

I have heard this call from captive males when they were presented to a stuffed female, and from wild males at the time of pair formation. It is uttered repeatedly, sometimes with some *chink* calls. Just as MARLER (l. c.) I have heard this call from males when both a female and another male were present. But I have also heard it from two males near each other. This further confirms the conclusion of MARLER (l. c.) that the bird while giving this call shows signs of aggressiveness. It seems as only females responds to this call. A female at pair formation approaches a calling male.

9. The *tchirp* courtship call.

This courtship call of the male is given later in the breeding season than the *kseep* but in a certain period they are both to be heard. The *tchirp* call seems to be given when the male no longer shows a tendency to attack the female, but to flee from her. It is given while courting the female and it probably

attracts the female. It is very similar to the chirps in the subsong and to the begging call of the fledglings (see plate VIc). It consists of 4 or 5 rapidly oscillating notes falling in pitch (see plate III i).

10. The *seep* courtship call.

This is the only courtship call of the female. The male is attracted by the calling female and courts it. It is short and high-pitched and similar to the *kseep* call of the male. This call is given especially by females ready to copulate, but is also to be heard a little earlier. It is repeated regularly and both when the bird can see and/or hear the male and when it is alone while feeding and building. When showing soliciting display the call is repeated very rapidly. I have often seen the soliciting behaviour and heard the *seep* call evoked in a female by a strange male, a stuffed male placed nearby or by a flying female and by flying House Sparrows (*Passer domesticus*). Unfortunately I have never been able to get tape-recordings of this call.

11. The begging call of nestlings.

In the first days the nestlings beg silently by raising heads and gaping. After some days they utter a note which is just audible. This note, subsequently, develops into a soft *cheep*, when the nestlings are begging with wobbling movements of the head. The note is given until the young leave the nest about the 14th day. It is of a rather complex structure and consists of some simultaneous notes, of which the higher ones rise and fall in frequency, whereas the lowest ones do the reverse (see plate VI b).

The begging call is given in rapid successions when the young are being fed, both when actually being fed and when only gaping. It is evoked by the parents arrival at the nest, in the first days when the young are blind, by the landing of the parent bird, later also by the sight of the adult bird, but the call may also be evoked by the calling of the other nestlings. The adult birds have no feeding note as have the Bullfinch (*Pyrrhula pyrrhula*) and many other passerines (Nicolai 1956).

12. The begging call of fledglings.

It is a loud *chirrup* given by the young when they have left the nest at an age of about 14 days. It consists of a series of rapidly oscillating notes falling in pitch (see plate VIc). As already mentioned it is very similar to the *tchirp* courtship call of the male. It is given in regular succession and the parents easily locate the calling young. After feeding, the young is silent for some time.

When the young are gaping at the parent with wobbling movements of the head and sideways rocking movements of the body the calls are repeated rapidly and loudly. While the bill is open the call changes into an outdrawn note.

When the young at the age of about one month become independent of the parents the call disappears. In hand-raised young I have seen that at the same time as the begging response is shown more and more weakly the begging call gets softer. But even after they have begun to be independent they sometimes show a weak begging response and give the call when a visitor approaches the cage.

MARLER (l. c.) states that after the young have become independent of the parents this call is used as a social call and during owl mobbing until the adult calls develop.

13. The alarm call of juveniles.

This call is a soft *tew* which is given by young birds after they have left the nest. According to MARLER (l. c.) it is rarely heard from adult birds. It is evoked by danger and the birds show escape behaviour. I have only heard this short soft note a few times in hand-raised young birds and I have not been able to get a good tape recording of it. According to MARLER (l. c.) the *chink* call develops out of this call.

Discussion.

The repertoire of the calls of the Chaffinch comprises 13 calls. MARLER (1956a) enumerates 14 calls, but it is because he considers the subsong as a distinct call. According to this author the basic calls including all variations amount to 21 different signals. Three calls are common to female and male throughout the year, viz. flight call, social and alarm call and

perhaps injury call, and an aggressive call is used by both sexes in the breeding season. Further, the male has 5 calls limited to the breeding time, viz. 2 alarm calls, 2 courtship calls, and song. The female has only one courtship call. Thus the male possess a total of 9 calls, and the female 5. The nestlings, finally, have a begging call, the fledglings a begging call and the young birds an escape call.

A comparison of the sonograms of the calls in the present paper with those of MARLER (*l. c.*) shows that the calls of the British Chaffinch and the Chaffinch in Denmark are very similar except for variants in song and in the male *huit* alarm call. Some minor differences in the sonograms of the male *tchirp* call, the begging call of nestlings and the begging call of fledglings may be due to differences in the technique applied.

In hand-raised Chaffinches reared in isolation from other Chaffinches the calls develop normally and have not to be learnt except for the song and, possibly, for the variants of the *huit* alarm call. I have, however, not heard the female courtship call in these birds because the caged females never reached breeding condition; neither did I hear the aggressive call from the hand-raised birds. According to MARLER (1956a), who has studied the ontogenetic development of the calls, the *chink* call is sometimes abnormal in isolated birds and sometimes it may be modified by learning. The basic pattern of the song is innate (see plate Va), but the complete song has to be learnt (POULSEN 1951, THORPE 1954). THORPE states that the Chaffinches learn both as juveniles and later in their first spring, and that they not until then acquire their normal song which then is retained with little or no alterations. It is especially the end-phrase which is subject to learning. The learning takes place during the males counter-singing with other males.

The *huit* call developed normally in birds reared in isolation, and therefore I said in my previous paper (POULSEN 1951) that this call is innate. My birds originated from the population near Copenhagen which only has the *huit* call. Of course the variations of this call may be subject to learning, as suggested by SICK (1939 and 1950) and by PEITZMEIER

TABLE I.
Inventory of Chaffinch calls.
Fortegnelse over Bogfinkens stemmer.

		♂	♀	Throughout the year *Hele året*	Only in the breeding season *Kun i ynglet iden*
Flight call ..... *Flugtstemme*	*tsup* jyb	+	+	+	..
Social and alarm eall ..... *Lokke- og farestemme*	*chink* pink	+	+	+	..
Injury eall ..... *Smerte- og farestemme*	*seee* tii	+	+(?)	+(?)	..
Aggressive eall ..... *Angrebsstemme*	*zzzz* zzzz	+	+	..	+
Alarm call ..... *Farestemme*	*seee* tii	+	..	..	+
Alarm call ..... *Farestemme*	*huit* uit	+	..	..	+
Song ..... *Sang*	..	+	..	..	+
Courtship call ..... *Parringsstemme*	*kseep* tsi	+	..	..	+
Courtship call ..... *Parringsstemme*	*tchirp* tjse	+	..	..	+
Courtship call ..... *Parringsstemme*	*seep* ti	..	+	..	+
Begging call of nestlings .... *Fodringsstemme hos redeunger* ..	*cheep* tjip	+	+	..	..
Begging call of fledglings .... *Fodringsstemme hos udfl. unger*	*chirrup* tjse	+	+	..	..
Alarm call of juveniles ..... *Farestemme hos ungfugle*	*tew* tju	+	+	..	..

(1955). I tried to settle this question by rearing some youngs in 1957 from the isle of Bornholm, since this population has a variant of this call (see p. 93), but unfortunately these birds died.

Some idea of the communicatory function of the calls has been given when mentioning the different calls. An analysis of the calls as a means of communication has been made by MARLER (1956a).

DANSK RESUMÉ

De danske Bogfinkers (*Fringilla coelebs* L.) stemmer.

Det har hidtil været meget vanskeligt at gengive fugles stemmer; man har været henvist til at bruge en mer eller mindre god lydskrift, der varierer fra sprog til sprog, sml. f. eks. de engelske og danske betegnelser i nærværende arbejde. I de senere år er det imidlertid blevet muligt at gengive fuglestemmer på en fuldstændig nøjagtig og objektiv måde. Først optages lydene på et magnetisk bånd med en tape-recorder. Derefter omsætter man disse lyde i en sonograf til et sonogram eller lydspektrogram, hvor tonehøjden (frekvensen) aflæses på den lodrette akse og tiden i sekunder på den vandrette akse, mens lydens større eller mindre styrke (amplituden) angives ved mere eller mindre sorte partier. På denne måde får man et billede af fuglestemmerne, så man kan sammenligne dem og måle dem.

Flugtstemmen *jyb* (se tavle III a) gives af både hanner og hunner, der flyver eller er ved at flyve op. Andre Bogfinker svarer og følger.

Pink-lyden (se tavle III b) bruges i mange forskellige situationer af både han og hun hele året igennem. Som lokkestemme udstødes den enkeltvis; andre Bogfinker svarer og nærmer sig. Som farestemme gives den i serier, f. eks. ved synet af en ugle. Andre Bogfinker svarer og kommer til, og Drosler, Mejser, Sangere og andre fugle gør ligesådan.

Når Bogfinker bliver angrebet under kamp, eller når man tager dem i hånden, udstøder de en svag piben. Denne lyd findes vist nok kun hos hannen og måske kun i yngletiden.

Bogfinkens snerrende kampstemme *zzzz* (se tavle III c & d) hører man sjældent. Den udstødes undertiden under kampe mellem artsfæller, men den høres især fra både hanner og hunner, der angriber andre fugle, der er kommet deres rede for nær f. eks. Gøg, Skovskade, Sangdrossel og andre Bogfinker. Udstoppede fugle af disse arter hakker de meget voldsomt i hovedet.

Når en rovfugl flyver over, udstøder hannen i yngletiden en meget fin piben *tii* (se tavle III j), mens den sidder fuldstændigt stille. Andre hanner svarer, og både hanner og hunner sidder stille eller flyver i skjul.

Hele yngletiden igennem, men især om foråret, høres jævnligt bogfinkehannens såkaldte regnvejrsstemme *uit* (se tavle III e). Denne stemme varierer geografisk og danner derved dialekter. Omkring København er det et blødt fløjt: *uit*, på Bornholm er det et tostavelses: *it it* (se tavle III g), og i Østjylland og på Fyn har bogfinkehannerne foruden et *uit* tillige et snurrende *ryt* (se tavle III f). Den samme *ryt*-lyd har Bogfinkerne visse steder i Skandinavien. Yderligere iagttagelser af disse variationer er meget tiltrængt.

Regnvejrsstemmen synes at komme i situationer med svagere fare, når sangen hæmmes, eller når tendensen til at synge af en eller anden grund er ret svag.

Både hos unge og gamle hanner begynder sangen om foråret som en svag kvidren, der ikke har megen lighed med den egentlige sang (se tavle V c). Er vejret mildt, begynder denne sang omkring midten af februar, og en uge eller to senere lyder der overalt høj og klar bogfinkesang. Sangen udvikler sig fra den svage kvidren til en noget kraftigere, men stadig ufuldstændig sang, der er kortere end den normale sang og bl. a. ofte mangler slutstrofen, »slaget«, der undertiden erstattes af en snurrende lyd: *trrr*. Denne sangtype høres også af og til, når den egentlige sang er begyndt. En lignende sangtype af en noget mere sammenpresset karakter frembringes af hannen under parringsspillet og kopulationen. Den består af nogle korte sangstrofer afbrudt af *tjse*-lyde og *trrr*-lyde, som ses på tavle VI a.

Den fuldstændige sang kommer hurtigere hos de ældre hanner end hos de etårige hanner, der på dette tidspunkt imiterer de gamle hanner, især hvad slutstrofen angår. Når sangen først er blevet helt udviklet, ændres den ikke, men bevares fra år til år. Ofte har de enkelte fugle 2–3 forskellige sange, der dog kun adskiller sig lidt fra hinanden.

Bogfinken synger sin fuldstændige sang fra nogle bestemte »sangposter« i sit territorium, og sangen gives kun i territoriet. Antallet af sange pr. min. er gennemsnitligt 6,6, men det varierer meget i løbet af dagen. Der er et maksimum ved solopgang, et mindre om formiddagen, og et der igen er lidt større om aftenen.

Sangen holder andre hanner borte fra territoriet og lokker i begyndelsen af yngletiden en hun til. Når hunnen har slået sig ned i territoriet, synger hannen ikke så meget som tidligere. Enlige hanner i bur synger meget og stimuleres yderligere til at synge ved at høre andre hanner eller ved blot at se dem, hvorimod synet af en hun får dem til at tie eller til at give deres parringslyde i stedet. En burfugl anbragt i en hans territorium holder op med at synge, når ejeren af territoriet begynder at synge, hidkaldt af burfuglens sang.

Sangen varierer en del, og forskellige egnes Bogfinker har forskellige sangdialekter. På tavle IV a vises en typisk sang fra Københavns omegn. Hos denne fugl var sangen meget udviklet og smuk. Dernæst er der den kendte bornholmske dialekt, hvor slutstrofen er kortere (se tavle IV b). Den næste sang stammer fra en skandinavisk Bogfinke, der har en kort skarp lyd lige efter slaget (se tavle IV c). Den findes i forskellige egne af Skandinavien. På tavle V a vises sangen af en burfugl, der ikke har hørt andre Bogfinker fra den var 5 dage gammel. Denne sang, der er meget enkel og mangler slutstrofen, »slaget«, er med andre ord det medfødte fundament i Bogfinkens sang. Den normale sang læres allerede i ungetiden og desuden i det følgende forår.

Når en hun har slået sig ned i hannens territorium, hører man ofte den ene af hannens parringsstemmer, et ganske svagt *tsi* (se tavle III h), som den gentager regelmæssigt hver gang den er i nærheden af hunnen. Man hører det også, når hannen flyver efter hunnen. Nogen tid senere giver hunnen en lignende lyd, lidt finere end hannens, nær-

mest som *ti*. Den gentages i hurtig rækkefølge, især når hunnen viser parringsopfordring.

Lidt senere i yngletiden hører man hannens anden parringsstemme, som nærmest kan gengives som *tjse* (se tavle III i).

Ungerne i reden giver allerede fra de er nogle få dage gamle nogle svage lyde, der lyder som *tjip* (se tavle VI b). Disse lyde kommer især, når ungerne strækker hals og gaber med sitrende bevægelser med hovedet, idet en af de gamle lander på reden.

I en alder af ca. 14 dage, når ungerne flyver af reden, udstødes en anden fodringslyd. Den lyder nærmest som *tjse* (se tavle VI c) og ligner hannens ene parringsstemme meget. Den gives med regelmæssige mellemrum, mens ungerne sidder i skjul spredt omkring. Forældrene lokaliserer ungerne efter deres stemmer, og når de kommer hen til en af dem, gaber den med vrikkende bevægelser med hovedet, samtidig med at den bevæger kroppen fra side til side. Under selve madningen bliver fodringsstemmen til en langtrukken lyd.

Når ungerne bliver lidt større har de en svag farestemme nærmest som *tju*. Denne lyd er vanskelig at konstatere og høres ikke ofte. Hos de voksne Bogfinker erstattes den af farestemmen *pink*, men *tju* kan høres hos gamle Bogfinker, om end sjældent.

Bogfinkens »sprog« består altså af 13 forskellige stemmer. Disse lyde er medfødte med undtagelse af sangen, der delvis skal læres. De forskellige variationer af regnvejrsstemmen skal muligvis også læres. Udover dette består variationsmulighederne i Bogfinkens »sprog« i at forskellige lyde kan gives i umiddelbar rækkefølge f. eks. *uit* og *pink*, *pink* og *zzzz* og *uit*, *pink* og *tii*. Desuden kan der være tale om, at der kan komme lyde, der er en mellemting mellem to lyde, f. eks. mellem *uit* og *tii* og *uit* og *pink*.

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