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SPECTROGRAM AND OSCILLOGRAM COMPARATIVE ANALYSIS OF NIGHT HERON (NYCTICORAX NYCTICORAX L.) ADVERTISING CALL

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Abstract

The gargling, advertising call of the night heron was analysed by two different physical methods: spectrogram and oscillogram analysis. Similar parameters of frequencies were obtained and calculated by the two methods. No regular intensity changes were observed in the oscillogram.

The clusterlike occurence of the call was demonstrated and beside advertising a group coherent function was proposed.

Introduction

In previous work (WOLLEMANN 1980, 1984) a spectrogram analysis was published from different heronries calls esp. night herons, focused on a call present only during the nesting period, which was defined as a gargling, advertising call.

In the present work this call was analysed further by using two independent physical methods i.e. spectrogram and oscillogram analysis were performed. The spectrogram records the freqency distribution of the call in time, whereas the oscillogram reflects directly the intensity changes of the call. It is possible to measure by videodensitometry the intensity of the call from the spectrogram (WOLLEMANN and OLASZY 1976). Using magnification and retardation frequencies can be calculated from the oscillograms of the calls (ALBERT 1983).

Our purpose was to compare the data given by the two different methods and to gain more information on the function of this call.

Methods

Night heron calls were recorded at the heronry of Labodár on May 1, 1984. The microphone FM-300A (Jin-In El. Co) was fixed on a poplar tree at 6 m height from the earth. The microphone was steered by a magnetophone (SANYO, M 2502-U) from some distance before the channel (see map in Wollemann 1981).

Spectrogram analysis was performed as previously described (WOLLEMANN and OLASZY 1976) with a Sound Spectrograph Series model (Voice Identification Inc). Oscillograms were produced on an EMG TR 4653 type oscilloscope at different speeds and pictures were taken with a MOM MF 1—1 camera. Both recordings were carried out before and after filtering off the background noises. Frequency analysis from oscillograms was calculated as described by ALBERT (1983) according to SMETANA (1975) and SVÁB (1981).

Results and Discussion

Previous spectrogram analyses were made after cutting the background noises below 500 Hz (WOLLEMANN 1980 and 1984). Presently both way of spectrogram recording are demonstrated i. e. without filtering the background noises (Fig. 1) and after cutting the background noises below 500 Hz (Fig. 2). As it is seen from the

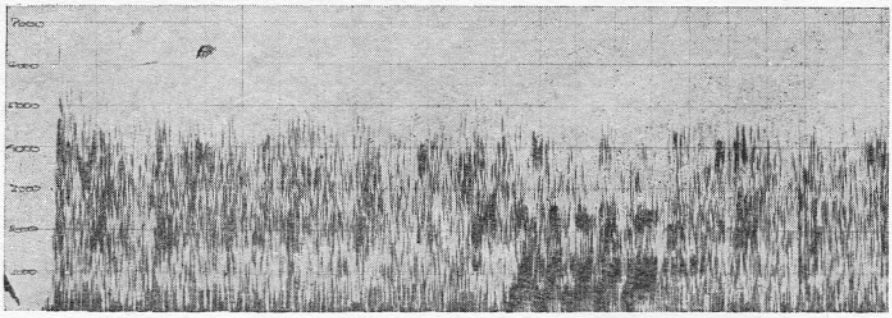

Fig. 1. Sonogram of night heron advertising call cutting the background noises below 500 Herz

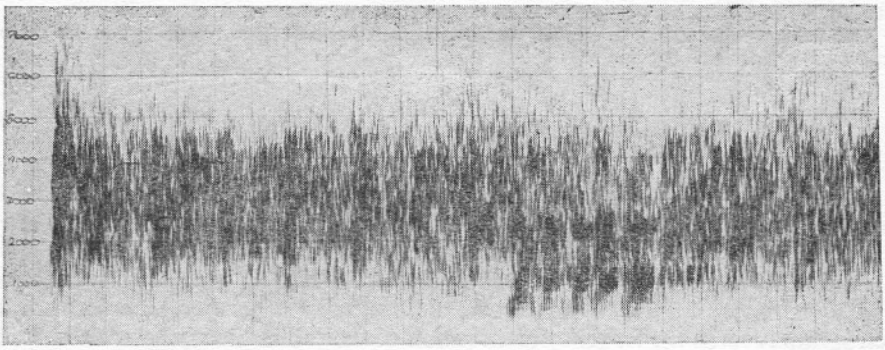

Fig. 2. Sonogram of night heron advertising call without filtering the background noises

figures substantial part of the calls are produced below 500 Hz. The frequency is raising till 1100—1200 Hz and a third harmonic is appearing at 2200 Herz. The call was repeated 5 times and lasted 0.4 sec.

The same call analysed by oscillogram showed no regular periodicity in intensity changes (Fig. 3). By calculating the frequency from the number of soundwaves during a certain time period after varying the velocity of the electron beam and using a twofold (Fig. 4, 5, 6) slowing the following frequencies were calculated: 550 Hz as a ground-note modulated by a second (1100 Hz) and a third harmonic (2200 Hz). There was also a component at 280—290 Hz in both recordings covered by background noises.

The whole call as calculated by this method lasted 0.379 sec. The differences between the time measured by the two registration methods (0.4 resp. 0.379 sec) are due to the background noises, which are more disturbing in the second method.

The maximal amplitudes of the soundwaves varied during the five periods as follows: 22.2, 29.54, 20.6
19.5, 30.9 mm

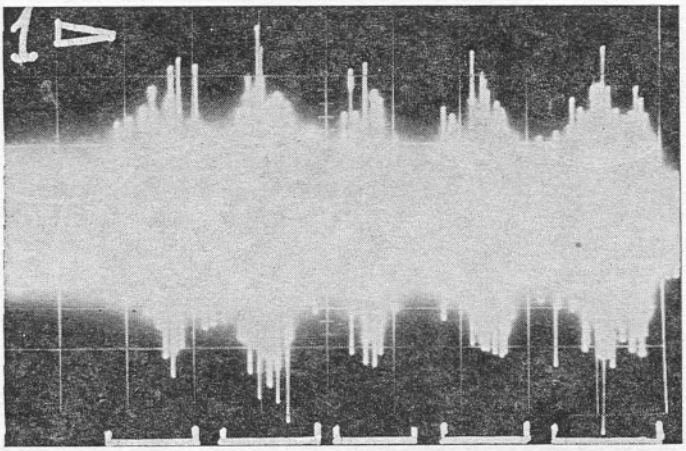

Fig. 3. Oscillogram of the night heron advertising call. Sensitivity 0,05 V/cm; velocity of electronbea 0,1 sec/cm; filtration of background noises below 240 Herz; recording is twofold slowed down

Ethological observations were performed during the sound registration with the following results. The night heron nests were located in contrast to previous years of observations (1978—82) near to the grey herons nests behind the channel on the poplar trees. The reason of abandoning the former willow tree colony, which was more near to the dam was probably that owing to constant low levels of the Tisza river in 1983—84 there was no flood during the springtime as usual, and the willow tree part of the former colony became entirely dry.

We observed on May 1, in Labodár 27 pairs of grey herons, 35 pairs of night herons and 3 pairs of little egrets, which shows a decrease in the number of nesting pairs as compared to previous numbers of night heron and little egret nests (BOD and MOLNÁR 1979, WOLLEMANN 1980). As to the function of the night heron call, there

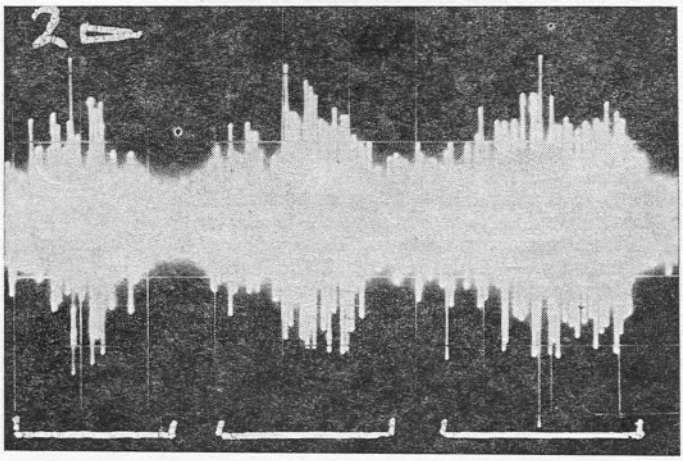

Fig. 4. Oscillogram of the third, fourth and fifth phase of the night heron advertising call. Parameters are the same as in Fig. 3. with exception of electronbeam velocity: 50 msec/cm

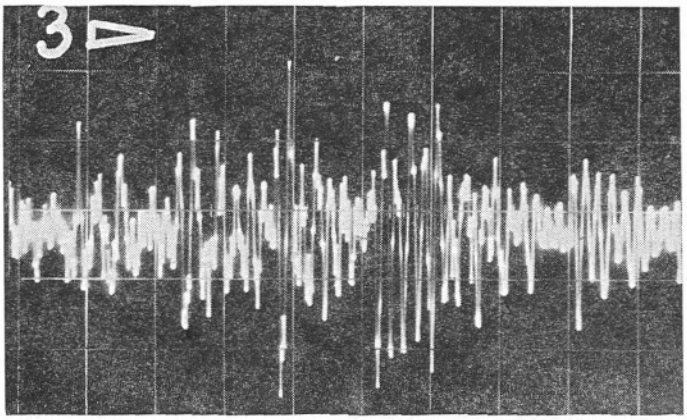

Fig. 5. Oscillogram of the third phase of the night heron advertising call. Parameters are the same as in Fig. 3. with exception of electronbeam velocity: 20 msec/cm

was nothing which could strenghten the pair greeting or nesting function of the call as previously stated (WOLLEMANN 1984), but clusterlike occurence of different lonely standing night heron calls were audible.

In a period starting from 5.28 p.m. the interruptions between the calls were as follows:

3″ 1″ 52″ 33″ 2′52″ 15″ 2″ 9″ 4″ 2′37″
3″ 21″ 10″ 10″ 5″ 1″ 1″ 1″ 1″ 1, 18″ 3″...

This demonstrates well that after a few minutes of interruption clusters of 4—5—8 calls appeared. Therefore beside the advertising character of the call a group coherent function could be also attributed to it.

Future investigations has to demonstrate the eventual differences between the individual calls in one bird and between more of them.

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A bakcsó (Nycticorax nycticorax L.) reklámhangjának spektrogramos és oszcillogramos vizsgálata

Kivonat

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A bakcsó reklámhangját két módszer eredményeinek összevetésével vizsgáltuk, szonogram és oszcillogram segítségével. Mindkét esetben hasonló eredményeket kaptunk a frekvencia értékekre vonatkozóan. Az oszcillogram kimutatta, hogy nincs determinisztikus hangerősség változás. A kiáltások csoportosulása a jel reklámozó és csoportösszetartó funkciójára utalt.

Спектральное и осциллографое цзучвие крикливой рекламы кваквы Nycticorax

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Резюме

Исследование крикливой рекламы *Nyctieorax nyctieorax* провели на основании сочетания двух методов. В обеих случаях относительно их фреквенции получены одинаковые результаты. Осциллограмма показала, чтоь нет никаких изменений в силе детерминального звука. Изданный сильный крик рекламирует-оа Имхнуи Н групповой солидарности.

Spektrogramska i oscilogramska ispitivanja ogla avanja gaka (Nycticorax nycticorax L.)

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Abstrakt

Ispitivanja signalnog oglašavanja gaka vršena su uporednom analizom rezultata dobijenih sonogramskim i oscilogramskim registrovanjem. U oba slučaja dobijeni su slični rezultati u odnosu na frekvenciju. Oscilogramom je utvrdjeno da nema determinističkih promena u jačini oglašavanja Grupacije glasovnih efekata ukazuju na funkciju signalizacije i okupljanja kolonije.