

REVIEW

by Prof. Dr Ivan Penchev Georgiev Dsc, Department of "Pharmacology, Animal Physiology, Biochemistry and Chemistry", Faculty of Veterinary Medicine, Trakia University, Stara Zagora,
Scientific specialty "Animal and Human Physiology"

Regarding the dissertation work for the acquisition of the PhD degree in the scientific specialty "Animal and Human Physiology" entitled "Dog's communication signals presented in soundgrams in different behavioral reactions" presented by Pavlina Ivanova Hristova from the Department of "Anatomy, Physiology and Animal Husbandry Sciences", Faculty of Veterinary Medicine, University of Forestry, Sofia

Scientific consultant Assoc. Prof. Dr Violeta Alexandrova

Before starting the presentation of the review, I will note that the dissertation work and all attached documents are in accordance with the requirements of the normative acts, incl. Law for the development of the academic staff in the Republic of Bulgaria and the Regulations for its application. In addition, a signed declaration of authorship certifying the originality of the material in the dissertation is also presented

1. Relevance of the dissertation topic

The dissertation submitted for review is in a very interesting and still not well studied area such as understanding the animal's language, including dogs. The elucidation of this problem would contribute significantly to the assessment of communication both between the animals themselves and with man, in

assessing their behavioral activity such as state of comfort-discomfort, aggressiveness, susceptibility to training, etc. The prevailing opinion in the scientific community is that animals lack a second signaling system, resp. conscious activity. Recently, however, a number of data show that the beginnings of such activity and reactions can be observed in some animals, especially in primates and dogs. Speech is also known to be one of the most important factors in evolution, underlying the second signaling system and socialization in humans. In this regard, I believe that the topic of the dissertation is very relevant and interesting in view of the relatively limited research and published experimental data in the scientific literature.

2. Structure of the dissertation work

I will note that the dissertation work is very well structured, with an adequate balance between the different parts. It contains all sections necessary for such a scientific work: Introduction; Literature review, aim and objectives; Material and methods; Results and discussion; Conclusions, contributions and recommendations for practice; References.

3. Introduction, literature review, aim and objectives

In the introduction section, the main problem of the dissertation work is announced, namely the need for a better knowledge and analysis of the sound signals of the dog, with a view to improving the approach of veterinarians in their daily work in small animal clinics, related to the examination, diagnosis and the treatment. In addition, knowing the characteristics of a dog's bark would also contribute to facilitate training and a faster adaptation of the dog to different

activities. In the literature review, a critical analysis of the available information on the issues of the dissertation work was carried out. A large number of literary sources are cited, the majority of which are from the last 10-15 years, which is an indicator of a very good awareness of modern methods and achievements in the field of recording and analysis of sound signals in general. The anatomical structure of the larynx and the physiological and neurophysiological mechanisms of sound formation are described in detail, and some features of the dog compared to felids and other canids (wolf) are highlighted as well. The phonetics of the sound, the sound structure of the language and the elements of the sound are also described with an emphasis on the sound wave and its physical characteristics - amplitude, frequency, length, period and psychophysical parameters – sound pitch, strength, timbre and their interactions as well. A detailed description of the dog's sound signals in a comparative aspect with other representatives of the genus canids and felids is also given: vocal - barking, howling, growling, whimpering, squealing, chewing; mechanical - teeth chattering and throat breathing and mixed forms - barking with growling, barking and teeth chattering, howling with barking. At the end of the review, modern methods based on computer programs and special software products for decoding sound signals, which were used in the dissertation research, are presented: wave decoding, decoding through spectrograms and decoding through soundgrams.

A very good impression is made by the short summary at the end of the literature review, in which, based on what is known so far about the acoustic structure and the time and frequency range of the emitted sound, the lack of information about the role of the amplitude and frequency characteristics of the sound signals in the dog depending on age, breed, gender, certain behavioral reactions etc. Based on this summary, the goal of the research logically follows, which is correctly formulated and fully corresponds to the topic of the dissertation. The main goal of the present dissertation work is the registration and analysis of

the sound signals of the dog using three methods during different behavioral activities (playing, aggression, feeding and anxiety), manifested both individually and in a group. Five specific tasks have been set, the implementation of which guarantees the achievement of the goal.

4. Material and methods

From the "Materials and methods" section, it can be seen that a considerable amount of experimental work was carried out. A total of 24 domestic and socialized dogs of different breeds and of different ages were used, divided into 3 groups depending on the size of the breed, with an equal number of males and females (4 each) in each group. I find the choice of the dog as a very appropriate object of research, since some senses such as auditory and olfactory systems are functionally more sensitive even than in humans. At the same time dogs have very good communication skills and are the most commonly kept pets. In addition, the subdivision of dogs by sex, breed (large, medium, small), age and the studies alone or in a group allows for a more detailed discussion of the data from the recorded soundgrams as well as from the waveform and spectral analysis. The recordings of the dog's barking were made with specialized digital equipment. A total of 1,200 barks were recorded. The acoustic analysis of the recordings was carried out with specialized software adapted to animal sounds, which makes it possible to more accurately distinguish the individual elements of the graphics from the registered sound signals, resp. for more accurate analysis. Statistical processing of the experimental data is adequate to the set goal and tasks which guarantees of the reliability of the obtained results.

5. Results and discussion

The obtained results are very well presented as graphs and tables. Firstly the individual recordings of barking of all dogs by the three methods are given, and then the intergroup differences in the mean values of the frequency and amplitude characteristics are compared. I appreciate the chosen approach based on the use of 3 different methods for registering the sound signals - waveform, sound spectrum and soundgrams, which gives more detailed information about the individual characteristics of the sound signals - strength, amplitude, frequency, spectral frequency density. This gives opportunities for a more detailed discussion, since the information on the problems of reading the language of animals in general, including and the dog is too scarce. In this respect is the original nature of the experimental data obtained in the dissertation, which are inevitably an important contribution to the study and unraveling of the dog's language with a view to evaluating its communicative abilities and various emotional states and behavioral activities - playing behavior alone or in a group; antagonistic behavior alone or in a group; eating behavior and anxiety alone. The author has chosen a model for presenting the results and the discussion in one section. This approach has its advantages and disadvantages. The advantage is that this allows for discussion of each specific result, and the disadvantage is that it makes the overall interpretation of the data difficult. I will note that the author has overcome this shortcoming by providing a more extensive discussion of his own results in the context of those of other authors at the end of the section. In this regard, I greatly appreciate the author's ability to successfully analyzing and interpreting his own results and draw in relevant conclusions, which is very important in view of the current and future work as teacher of Physiology.

Eight specific conclusions have been made, which are directly related to the set goal and provide in a synthesized form the most important results of the

conducted research. I accept the three original and two confirming contributions, as I definitely consider that they contribute significantly to understanding the dog's language in various behavioral reactions and to its further study. As a consequence of this, the author makes 4 recommendations for practice, the observance of which would be essential for both owners and veterinary medical specialists when evaluating various emotional states by the sound signals emitted by dogs, which would facilitate work with them, their socialization and training.

The author presents 3 co-authored dissertation publications, 2 of which he is the lead author of. In view of the interesting subject matter and the relevance of her scientific interests, I strongly recommend Pavlina Hristova to present her articles also and in other specialized journals in Bulgaria home and especially abroad, where I am sure they will be evaluated on merit.

I was member of the department meeting for preliminary discussion of the dissertation and I found that the author has taken in mind most of the recommendations.

The abstract accurately reflects the content of the dissertation and provides information on the most important results, conclusions and recommendations.

In conclusion, I believe that the set goal and tasks are successfully achieved. In terms of structure and content, the dissertation meets the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria and the Regulations for its application. Important contributions of scientific-theoretical and applied importance have been made, which I definitely consider to be an important step in the direction of further studying and deciphering the dog's language. In addition, as is evident from the submitted documents, incl. the opinion of the Leading sector "Academic Staff" at University of Forestry, the candidate fulfills the minimum national requirements for obtaining the PhD degree. Therefore, I give a highly positive assessment of the conducted research and the obtained results and I will vote "yes" for the awarding of the PhD degree

to Pavlina Ivanova Hristova from the Department of "Anatomy, Physiology and Animal Breeding Sciences", Faculty of Veterinary Medicine at University of Forestry, Sofia in the scientific specialty "Physiology of Animals and Humans", scientific area 6. Agricultural sciences and veterinary medicine, professional direction 6.4. Veterinary Medicine.

05.12.2023

Stara Zagora

Signature:

(Prof. Dr Ivan Penchev, Dsc)