The heart death was studied electrocardiographically in three European bisons, 4, 6 and 14 years old. During fast blood loss there was a reflex acceleration of heart action as a reaction to rapidly decreasing arterial pressure. Symptoms of hypoxaemia of the heart muscle and slowing of heart action were observed after the loss of 3/4 of the blood. During the cessation of heart function the place of generating stimuli (starter) was changed and atrioventricular blocks appeared. The sinus rhythm was changing gradually into node rhythm. It was occasionally accompanied by atrioventricular extrasystoles. After clinical death heart action remained for variable time (from 30 sec to 3 minutes). During this period single sinusal or atrioventricular cycles were recorded. Ventricular flutter was never observed.

The mechanism of heart death has been studied for many years (Landendorf, 1897; Kulibabko, 1902; Pick, 1924; Smirnov, 1941) but this problem is still of considerable interest (Fogelson, 1957; Janiak, 1957 and others). The purpose of these investigations was to determine the sequence of disappearance of functions in different parts of the heart and to assess the possibility of reviving the heart after its clinical death. Dogs were used in most of the studies. Some observations were also made on humans. Large and free-living animals comparable to the European bison were not studied.

This communication presents results of electrocardiographic studies of the dying heart of European bisons subjected to experimental death by anaesthetising and gradual bleeding. Three male bisons were used: »Putar« (6 years old, pedigree book No 1026), »Plamiec« (14 years old, pedigree book No 789) and »Puck« (4 years old, pedigree book No 1131).

It was found that the process of heart dying was very similar in all three cases and differed only in the final stage. Reflex acceleration of heart action occurred during fast blood loss as a reaction to decreasing arterial pressure. Large loss of blood was causing hypoxaemia of the heart muscle, symptoms of coronary insufficiency and disorders of the heart rhythm. In the next stage i.e. during cessation of heart functions the place of generating the stimuli starter (Kowarzyk) moved and partial blocks occurred indicating disorders in heart conduction. The sinus rhythm was changing gradually into node rhythm. Occasionally it was accompanied by arterioventricular extrasystoles (for example in »Puck«).
Fig. 1. The electrocardiogram of 6 year old European bison «Putar».

a) After issue of 7 liters of blood in 6 minutes; sinus rhythmus 166/min; wave P completely overlaps wave T.
b) After issue of 12 l of blood; sinus rhythmus 86/min.
c) Agony; movement of starter (Kowarzyk) to the lower centers of the conduction system ($PQ = 0.12$ sec).
d) Node rhythmus.
e) After clinical death — slow node rhythmus.
After clinical death, heart function did not stop and was observed for various periods of time in individual bisons (from 30 sec to 3 min). In this period only single cycles were recorded. They were of sinusal, arterioventricular or ventricular origin (in »Plamiec«, »Putar« and »Puck«, respectively) the latter case with markedly changed ventricular complex. In one European bison (»Puck«) there were single extrasystoles but ventricular flatter during the process of heart death was never observed in contrary to the findings in dogs (Janiak, 1957) and in humans (Hering, 1917). It could have been due to specific conditions of the heart death or else to peculiar characteristics of the heart of the European bison. This could be elucidated only by further studies.

Separate stages of heart death were recorded in the enclosed electrocardiographic figures 1—3.

REFERENCES


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