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ETHOLOGICAL ASPECTS OF PLANE'S PROTECTION AGAINST BIRDS

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Abstract

The birds have more chances to see a plane and to avoid collision than a pilot.The birds are training to extrapolate the direction and speed of a plane flight which exceeds more than two times the speed of birds.This explains why: 1.Migrating and local young birds fall victims of planes 2.Distruction of birds on an aerodrome doesn't decrease the bird danger for planes 3.The number of bird strikes increases relatively in the night,in clouds and when birds flight direction is changed 4.A plane from an indifferent stimulus is becoming a repellent and some time an attractant 5.The means to increase the distance of a plane discovery(landing and flashing lights,lazer)don't always frighten birds away of a plane because a/Birds don't know that a plane represents a danger b/Birds sit on runway or fly back to a plane c/The landing lights in the night render catching action on birds d/Birds attention is distracted when searching for food e/Young birds attack unproportionally large prey f/The flocks of starlings and snipes react by mistake on plane as a bird of prey. Taking into consideration all circumstances favouring conflict situation it is possible to outline concrete means,place and time of their application in order they will not be repeated in future.

The study of birds behaviour in the sight of a plane attracts many researchers especially in the connection with the intention to create an arrangement or means to frighter birds away from a plane or plane's way.

For the majority of birds fluing in the air or habiting on the ground the plane flying far in the sky is an indifferent stimulus. But on the airdroms and on the plantes routes where the ways of planes and birds are crossing-both are suffering.

It follows from the analysis of the bird strikes that pilots have noticed birds in the last moment before a strike in 9,7 - 18,3% of all bird strikes.Consequently,a pilot has no possibility to turn a plane away of birds in order to avoid a collision (Jacoby,Beklova,1981).The bird is first to notice the approachement of the tremendous plane with roaring engines and it has more chances to turn away from a plane and to avoid collision.A bird will do that if it learns that a plane represents a danger for it. Such study occurs individually,under the trial and error line,when a bird is thrown away of a plane by an air wave or in group-when a birds sees a plane to drop another birds in the flock. The same training takes place when unskilled bird follows or imitates the skilled bird which flies away in the time from the planes way.

What a bird is learning to ?

Under natural conditions the birds are avoiding collision with some fixed objects by extrapolating its flight speed and direction relatively to this object. But if a bird deals with another bird of the same species flying in opposite direction,then in this case the necessity appears to extrapolate the double speed and direction of bird's rapproachments(Jacoby,1981).The sharp peack of the number of bird strikes takes place just when the speed of plane's flight amounts to 140-150 k/h as soon as the speed of a plane and a bird rapproachements exceeds the double speed of a bird's flight.At airfield the birds learn fast to extrapolate the unusual great speed and direction of a plane's landing or taking-off.As a result the adult local-nesting birds learn to recognize dangerous places and they don't take food and even don't cross runway during plane's flight.The cases are observed when the birds of prey use plane's whirlwinds to get mouses or grasshoppers which are frighten out nearby runway(Jacoby,1977). The birds learn to recognize the plane's kinds being exploited at given airfield.When the new,more powerful kind of a plane is put into operation - the bird strikes are being noticed at first which cease as a result of another birds training.

Such an approach explains why :

1. The birds which see for the first time a plane at close distance fall more often as a victims of a bird strike; that is local young birds on airfield and migrating birds. Because untrained birds can not extrapolate the unusual high speed of a plane's flight(Jacoby,1981).
2. The possibility of bird strikes is increasing when a plane appears unexpectedly from a cloudness, in the darkness,and under the change of its flight direction during the turn when taking-off or landing(Jacoby,1981).
3. The destruction of birds on an airfield doesn't prevent bird strikes. Because it is impossible to destruct all birds migrating across an airfield and because the killed birds are quickly substituted by population nearby airfield which are more dangerous for planes than local birds(Jacoby,1979).
4. A plane is becoming for local airfield birds from an indiffe-

rent stimulus to repellent from runway.This occurs as a result of a bird training - individual or in group.
5.Means increasing the distance of a plane discovering by the birds don't always give the desired effect of frightening birds away from flying plane. If a bird doesn't know that a plane is dangerous it turns aside of it in the last moment.

We will stay more in detail on the last conclusion. The light of landing lights of the landing or taking-off plane in the day can hardly increase essentially the frightening action of a plane on birds and on the distance of a plane discovery by a bird. The more that a plane is becoming a repellent as a result of bird training. Consequently the more distant discovery of a plane by birds helps to avoid bird strike by trained birds only. This is confirmed by lack of statistically reliable data about the influence in the day of switched on landing lights and of the powerful flashes of lights at the end of a wings(Anonymous, 1979,Reed,1982) on the reduction of bird strike number.It was shown in the experiments that the birds in dark cage are orienting their flight at the single source of light which appears in darkness(Liepa,1978). During the night in the full darkness the light of landing lights renders the same catching action on birds. The birds see only the light of a plane's lights and they don't see its silhouette.This is increasing the number of bird hits at various parts of a plane and at the lights themselves. According to our data(Jacoby,1978) there is noted statistically relyable greater number of bird hits at switched-on lights of Tupoleff planes where the lights,when switched-on,move out from fuselage. The area of lights amounts to 1% from the front section of a plane,but the birds hit at the lights in 8 to 15% cases of all night bird strikes, taking into consideration that the lights are switched-on for short time only, during the landing. It was shown(Verheyen,1980) that during the moon nights the probability of bird strikes is decreasing. This is connected apparently with the fact that the bird see the silhouette of an approaching plane and this reduces the catching action of the landing lights. By analogy with that the birds don't hurt against beacon's glasses in the moon nights. The additional lightening of the flying plane's front surface in the night plays the same role(Bellrose,1971). Speaking on means to frighten birds away from flying plane one can not but mention the possibilities to use lazer. The action of lazer's ray on flying bird is not studied. In our opinion the lazer's ray acts on birds eye as sunray flashing. If ray's sparkling on a plane will make it possible for a bird to discover a plane at greater distance - this doesn't mean that a bird will start earlier its maneouvre to avoid a plane. A bird may not notice at all the lazer's ray, the light of the landing and flashing lights if it flies or sits back to coming plane. The last occurs with birds sitting on or nearby runway. The planes are landing and taking-off against the wind.The birds resting on the ground usually are sitting with front against the wind and consequently - back to a plane.They discover the approachment of a plane not according an optical stimulus(the sight of a plane and various lights on a plane),but according to acoustic stimulus - the noise of engines. This explains why the number of bird strikes with broad fuselage planes (B-747 and other)exceeds 6 times more that with narrowfuselage planes(B-707 and other)(Burger,1983). By first ones the noise of engines is lesser and the speed of running is greater than by last ones. Therefore the birds have less time for an avoiding

manoeuvre after hearing broad fuselage plane.It is necessary add that the birds not only sit by front against wind but fly up against wind, that is - fly some time over planes flight(Jacoby, 1974).The drowning of the plane engines sound by contrary wind may have some importance. There is series of factors determining nuances of the birds behaviour and consequently - the visual or acoustic birds reaction to a plane. The observations have shown that sitting gulls are oriented by a head toward wind.But when the wind blows from the sun side - the gulls are turning by back to it(Puigcerver,Rodrigues,Teijeiro,1984). In this case they will see firstly a plane and then will hear it.Undoubtedly the fact may be of importance from what side- that is from the side of the sun or against it - the birds are looking at coming plane. The landing and flashing lights,the lazer ray may be concealed at all against a sun back ground. To number of the factors determining the bird behaviour in the sight of a plane one can add also the distraction of bird attention for food searching. The birds being occupied with food searching at or nearby the runway under conditions of strong noisy pollution at on airfield may hear the noise of the landing or taking off plane or see it in the last moment. In this aspect the flock feeding,flock resting or flock flying birds have an advantage before single feeding, resting or flying birds. There can be within the flock the trained birds which will first fly up or fly away from a flying plane carrying with and training by its behaviour the other unexperienced birds which are not trained to a plane as a danger. Besides,within the flock of feeding birds there is more probable the presence of birds whose attention is not distracted by food searching and who discover the plane's approachment and fly up earlier than other birds. This explains why the number of flock bird strikes amounts to only 22%(Jacoby,1974) and 12% according to Burger(1985).

Considerating bird reaction on planes we will cite some analogies in the behaviour of birds - victims of the bird of prey and on the contrary. For example when a hawk sttacks flock of starlings they are performing so called "air ballet" by maneouvring quickly by whole flock to one and to another side.This prevents bird of prey to make purposeful attack against single straggled bird.The utilisation of such tactics by flock of starlings against a plane leads to the fact that mass of birds are knocked down(Jacoby,1972).

The series of strikes committed by eagles,kites and hawks with planes are explained sometime by the fact that these birds attack plane when it flies nearby the nest and below the bird of prey,soaring in the altitude.I know according to my own experience that eagles and kites don't attack a man who reached their nest. Only goshawks attack a man at their nest. May be a bird soaring in termic doesn't make way for a plane. Coming to side it starts to come down. Therefore it may seam to a pilot of the fast approaching plane that a bird attacks plane. There are known observations that young hawks atta by mistake disproportionate great prey. In the same way one can explain the attack committed by an eagle in the autumn against truck driver in Turkmenia which was described by a newspaper.Attacks committed by eagles in the autumn against the low-speed gliders may be attributed to the same cathegory of phenomenons.

These facts show as according to trial-and-error method the birds of prey are trained to get a moving prey.

The examination of bird behaviour when seeing flying plane

shows what a great role is played by birds training and learning to extrapolate the speed and flight direction of a flying plane from the point of view of working out and of efficiency of various means to frighten birds away of a flying plane and to prevent bird strikes.

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