**Outdoor Classroom 1**

**Wall 1**

**Social Behavior in Nature and the Scientific Research at Hazeva**

**About the Research**

The biology, ecology, and social behavior of the Arabian babbler, a songbird with a complex social system, has been studied at the Shezaf Nature Reserve in Israel’s Arava desert region since 1971. The entire population of babblers being studied is tagged with colored leg bands.

The Hazeva babbler population has served as the foundation for several important scientific theories. Central among them are the Handicap Principle – the theory of honest signaling – and the understanding of the meaning of altruism among babblers and in nature in general.

**Background story**

One morning at the Shezaf Nature Reserve, four chicks hatched from four turquoise eggs. The chicks were fed by all members of the group of babblers. These babblers’ behavior differs from that of Israel’s other bird groups, as all members of the babbler group build a single nest. When one pair breeds, the others help raise the young.

In this case, when the nestlings were ten days old, researchers climbed up to the nest and tagged them with colored bands. One of the birds was tagged with red, white, metal, and black bands, and was given a name representing an acronym of the first Hebrew letter of each color – Altash. By the end of the year, researchers identified Altash as female.

**Naming babblers**

Babblers’ names are composed of letters signifying their band colors, generally each color’s first Hebrew letter. The bands are read from top to bottom, and from right leg to left leg.

Each babbler has three colored bands and a metal band imprinted with its identification number. Therefore, each babbler is labeled with the letter “Tet” (for “tabaat matekhet” or “metal band”) on one of their legs.

**Identification foldout panel:**

**Male**

“Nice to meet you. I’m Mr. Babbler. Look at my eyes – my pupil is surrounded by a bright yellow iris.”

**Female**

“Nice to meet you, I’m Ms. Babbler. Look at my eyes – my pupil is surrounded by a brown iris.”

**Chick**

“I hatched from my egg blind and featherless. My beak and mouth are bright yellow.”

**Fledgling**

“I just left the nest. The base of my beak is still yellow, and my irises are brown.”

**Nesting**

The nesting period is defined as the time from when the parents build the nest together until the last of the fledglings flies off. Because the birds are unable to fly while carrying a heavy pregnancy, the fetus develops outside of the mother’s body, within the egg.

The bird lays her eggs in the nest to protect them from predators and roosts to incubate them at a steady temperature, as in a pregnancy. This is not a simple task, as it limits the bird, who cannot leave the nest for an extended period of time.

Each bird species has its own way of successfully caring for its eggs and forthcoming nestlings.

**Nesting** **rotating panel:**

**The Babbler’s Nest**

The senior male and female birds build the nest, and the female lays four eggs among the tree branches. Sometimes, other females will also lay eggs, although the senior male and female birds usually incubate all the eggs themselves.

**The Blackstart’s Nest**

The couple builds their nest in holes and crevices. The female lays four eggs, which she incubates alone while the male guards and provides food for the nestlings.

**The Arabian Green Bee-eater’s Nest**

The bee-eater nests in a deep burrow. The nest holds 4–8 eggs, and both male and female share the work of incubating the eggs and caring for the nestlings. The burrow protects the eggs from rolling out and breaking.

**The Spotted Sandgrouse’s Nest**

The sandgrouse lays 2–3 eggs in a slight depression in the ground, and the eggs are camouflaged. The nestlings hatch after about 20 days and soon afterwards leave the nest and follow their mother.

**Wall 2**

**Group Life – Living Together**

**Social Behavior in Nature and Group Life**

Social behaviors among birds vary. Some flock together only during migration season, with a flock that flies in “V”-shaped formation able to fly more efficiently. Some nest together in colonies that provide safety and defense from predators, and others gather to sleep together to reduce the risk of predation and share information about the best foraging sites.

The framework in which birds live together in groups and all members of the group cooperate to rear the young is termed “cooperative breeding.”

**Rising panel: Social Behavior in Nature**

**Social Behavior in Nature and Group Life**

Flocks (starlings, cranes)

Colonies (seagulls, sparrows)

Shared sleep / information centers (wagtails)

Cooperative breeding (Babblers)

**Cooperation and Competition among Babblers – Two Sides of the Same Coin**

Do the following scenarios reflect cooperation or competition?

Rotate the panel for the answer.

**Rotating panel Cooperation/Competition**

The senior babbler Tagc feeds Latgl, the babbler immediately beneath him in the hierarchy, and replaces him on guard duty / Competition

Calht guards from predators at the tops of the trees while his flock mates forage on the ground / Cooperation

Calht guards from predators at the tops of the trees while his flock mates forage on the ground / Cooperation

Zpat and Glst, two senior babblers in the group, hurry to forage for food and fly to the nest to feed the nestlings. Which do you think will reach the nest first? / Competition

**Outdoor Classroom 2**

**Wall 1**

**Communication in Nature**

**Without Words**

When humans want to communicate, they use language and words as well as nonverbal communication, such as gestures, movements, and body language. While animals cannot communicate verbally as do humans, they do have many ways to communicate based on vocal sounds, signals, and body movements.

Communication signals among animals are used for marking their living territories, warning of predators, mating and reproduction, defense, warning against toxic dangers, and more.

**The Handicap Principle**

Animals send each other signals all the time: males call females to mate, rivals signals to each other that they’re strong. These messages must be reliable to be effective.

The messages must entail a cost – a handicap – for the senders, so that they can afford to send them only if they are in fact as large, strong, and successful as they assert. This is called the Handicap Principle, proposed by Professor Amotz Zahavi.

This principle is exemplified by the peacock’s impressive yet unwieldly tail and the deer’s heavy antlers as well as the altruism among babbler groups.

**Walls 1**

**The Handicap Principle in Babblers**

Professor Zahavi believed that the Handicap Principle includes not only physical handicaps. For example, he claimed that babblers competed using altruistic gestures, such as guarding and feeding, to demonstrate the individual’s fitness. According to the Handicap Principle, a babbler benefits from its investment in the group because the bird can demonstrate its abilities and earn prestige among the other group members, which increases its chances of climbing the social hierarchy.

Relations between babblers alternate between cooperation and competition, and these are, in fact, two sides of the same coin.

At age two-and-a-half, Altsh left the group and disappeared. Later, she was discovered by researchers in another group, where she had become the senior female after driving out the previous matriarch. She was later driven out herself and became the senior female of another group.

All the babblers in the group recognized Altsh as the undisputed leader. She guarded more than everyone else did, fiercely defended the territory, fed other babblers, kept other females away from the senior male, and laid all the eggs in the nest.

Why did she do so much for the group? And how does this behavior prove her fitness to her fellow babblers?

**On the left are babblers’ social behaviors. Rank them in the order of which actions you think most contribute to the group.**

**Social Behavior Rating Station**

**Babblers’ Activities** Preening/incubating/guarding/nest building/morning dance/nesting incubation

**Human Equivalents** Hugging/kindergarten/soldier on guard/children building with blocks/the *Hora* dance/feeding and giving charity

**Camouflage Colors**

Camouflage? Ornamentation? Warnings? Animals’ colors have many purposes. Birds’ colors are especially visible and important.

Bright ornamental colors have evolved in bird species in which the male does not take part in caring for the young and only fertilizes the female (like the peacock and sunbird). These colors reliably signify the male’s fitness and health.

Not only do the colors reflect the male’s health (an undernourished male cannot invest in ornamental colors), but they also make him more visible to predators. This helps the female select the most fit males. In these species, the female’s colors are dull in comparison and serve to camouflage her while she’s nesting and incubating her offspring.

**What Does My Color Say about Me?**

Warning colors

“Don’t eat me – I’m poisonous!”

*The poekilocerus grasshopper*

Brown camouflage colors

“Who sees me?”

“Where am I?!”

“Surprise!”

*Desert lark / Desert mantis / Painted carpet viper*

Green camouflage colors

“You’ll never guess that I’m here.”

*Middle Eastern jewel beetle*

Territorial declaration

“Warning! You’re on my property!”

*Brown-necked raven / Blackstart – desert songbird*

Seen from a distance, night and day

*Great gray shrike /Morning wheater/ Greater hoopoe lark*

Display colors

“I have nectar!”

*Loranthus*

Ornamental colors, calls attention but also endangers

“I’m the perfect mate!”

*Sunbirds*

Bright courtship colors

“See me? I’m healthy and strong!”

*Sinai rosefinch*

Accentuation and courtship colors

“Ornamentation or camouflage? It depends on who’s looking”

*Arabian green bee-eater*

Anti-glare coverage

“The mask of Zorro!”

*Great gray shrike*