A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A),

(Re- Accredited by NAAC with B Grade)

Jagannaickpur, Kakinada-533002, East Godavari, AP

DEPARTMENT OF ZOOLOGY & AQUACULTURE TECHNOLOGY

2019-2020

Guest lecture

By

Dr. N. Srinivas

A.S.D.GOVT. DEGREE COLLEGE FOR WOMEN (A)
KAKINADA

Department of Zoology

Invitation

The Department of zoology wishing to organize a "Guest lecture" on 26/08/2019 at 11Am for the 1st ,2nd ,3rd B.sc(CBZ) students in the seminar hall.

TOPIC: Evolution

President
M.Suvarchala M.sc, M.Ed. (Ph.D)

Chief Guest
Dr .N. Srinivas M.sc

Convener
Dr. K.Aruna. lec.in microbiology

I/C, Department of Zoology

Lecturer in – charge, 24/8/19
Department of Zoology
(A) Kakinada

M. Suvarchala 24/8/19
Principal
ASD Govt Degree College for Women

A.S.D.GOVT.DEGREE COLLEGE WOMEN (A) KAKINADA

LIST OF TEACHING STAFF

S.No.	Name of the employee	Designation	Remarks
1	M.Suvarchala	Principal	
2	P.Sanjotha	Lec in English	
3	Y.Swarna Sri	Lec in English	
4	K.Madhavi	Lecturer in Telugu	
5	Dr. D.Chenna Rao	Lec. in Chemistry	
6	V.B.Narayana Rao	Lec. In Chemistry	
7	V.Ananthalakshmi	Lec. In Chemistry	
8	Dr. S.Priya Darshini	Lec. In Chemistry	
9	P.A.S.S.Krishna Kumari	Lec. In Botany	
10	G.R.N.S.Sujatha	Lec. In Botany	
11	K.Vekateswararao	Lec. In Physics	
12	G.SriDevi	Lec. In Physics	
13	R.Shasikala	Lec. In Physics	
14	M.Madhavi	Lec.in Maths	
15	Dr.K.Aruna	Lec. In Micro Biology	
16	K.Lavanya	Lec. In H.Sience	
17	Dr. G.Anitha	Lec. In H.Science	
18	Dr.B.Anjani Kumari	Lec.in History	
19	P.Syama	Lec in Commerce	
20	R.Ramadurga Sireesha	Lec in Commerce	
21	Dr. K.Yamuna	Lec.in Economics	
22	N.N.Subhramanyeswari	Lec.in Computer Science	
23	G.Satya Suneetha	Lec.in Computer Applications	
24	G.Pramilarani	Physical Director	

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LIST OF TEACHING STAFF

S.No.	Name of the employee	Designation	Signatures
1	M.Subbalakshmi	C/F in Chemistry	
2	P.Rajya Lakshmi	C/F in Commerce	
3	K.N.B.Kumari	C/F in Commerce	
4	V.Venkata Ramana	JKC Mentor	
5	K.Kamakshi	Guest Lec in Telugu	
6	N.Durga Lakshmi	Guest Lec in Telugu	
7	P.Satya Naga Veni	Guest Lec in Hindi	
8	R.Aruna Devi	Guest Lec in Sanskrit	
9	P.S.N.Murthy	Guest Lec in Commerce	
10	M.Pushpa Latha	Guest Lec in Commerce	
11	A.Sandhya	Guest Lec in Commerce	
12	M.Sree Ramulu	Guest Lec in Economics	
13	P.Bhuvaneswari	Guest Lec in Politics	
14	S.Saptagiri	Guest Lec in Botany	
15	N.Kiranmayi	Guest Lec in Maths	
16	L.Bhanu Teja	Guest Lec in History	
17	U.Satyanarayana	Guest Lec.in Zoology	
18	L.Malleswari	Guest Lec in **Home Science**	
19.	A.K.V. Acharyulu	Asst. Librarian	
20	N.Veera Chanti	Guest Lec in CZAqT	
21	B.Sonia	Guest Lec.in Zoology	
22.	D.B Tavani	GL in English	
23.	MD. Hazara pareen	GL In commerce M.com	

ASD Govt. Degree College for Women (A)

Jagannaickpur, Kakinada

Activity register 2019-2020

Date	26-8-2019
Conducted through (DRC/JKC/NCC/NSS/Department)	**Department of zoology**
Nature of Activity (Seminar/Workshop/Extn. Lecturer ect.)	**Guest Lecture**
Title of the Activity	**Evolution**
Name of the Department/Committee	**Department of zoology**
Details of Resource Persons (Name. Designation ect.)	**Dr. N. Srinivas M Sc., PhD.,**
No. of Students Participated	**I, II & III BSc CBZ**
Brief Report on the Activity	**To raise the spirit of the students developing their skills on general knowledge besides learning**
Name of the Lecturers who Planned & Conducted the Activity	**U. Satyanarayana** **N. Veera Chanti** **B. Sonia**
Signature of the in Charge	**Dr.K.Aruna lecturer in microbiology**
Signature of the Principal	H. Suvarchala 9/9/19
Remarks	

Darwin, evolution, & natural selection

Charles Darwin's voyage on the HMS Beagle and his ideas about evolution and natural selection.

Key points:

- Charles Darwin was a British naturalist who proposed the theory of biological evolution by natural selection.
- Darwin defined **evolution** as "descent with modification," the idea that species change over time, give rise to new species, and share a common ancestor.
- The mechanism that Darwin proposed for evolution is **natural selection**. Because resources are limited in nature, organisms with heritable traits that favor survival and reproduction will tend to leave more offspring than their peers, causing the traits to increase in frequency over generations.
- Natural selection causes populations to become **adapted**, or increasingly well-suited, to their environments over time. Natural selection depends on the environment and requires existing heritable variation in a group.

What is evolution?

The basic idea of biological evolution is that populations and species of organisms change over time. Today, when we think of evolution, we are likely to link this idea with one specific person: the British naturalist Charles Darwin.

In the 1850s, Darwin wrote an influential and controversial book called *On the Origin of Species*. In it, he proposed that species evolve (or, as he put it, undergo "descent with modification"), and that all living things can trace their descent to a common ancestor. *[What exactly is a species?]*

Darwin also suggested a mechanism for evolution: natural selection, in which heritable traits that help organisms survive and reproduce become more common in a population over time. *[What does "heritable" mean?]*

In this article, we'll take a closer look at Darwin's ideas. We'll trace how they emerged from his worldwide travels on the ship *HMS Beagle*, and we'll also walk through an example of how evolution by natural selection can work.

[Early ideas about evolution]
[Influences on Darwin]

Darwin and the voyage of the *Beagle*

Darwin's seminal book, *On the Origin of Species*, set forth his ideas about evolution and natural selection. These ideas were largely based on direct observations from Darwin's travels around the globe. From 1831 to 1836, he was part of a survey expedition carried out by the ship *HMS Beagle*, which included stops in South America, Australia, and the southern tip of Africa. At each of the expedition's stops, Darwin had the opportunity to study and catalog the local plants and animals.

Over the course of his travels, Darwin began to see intriguing patterns in the distribution and features of organisms. We can see some of the most important patterns Darwin noticed in distribution of organisms by looking at his observations of the Galápagos Islands off the coast of Ecuador.

Darwin found that nearby islands in the Galápagos had similar but nonidentical species of finches living on them. Moreover, he noted that

each finch species was well-suited for its environment and role. For instance, species that ate large seeds tended to have large, tough beaks, while those that ate insects had thin, sharp beaks. Finally, he observed that the finches (and other animals) found on the Galápagos Islands were similar to species on the nearby mainland of Ecuador, but different from those found elsewhere in the world[2].

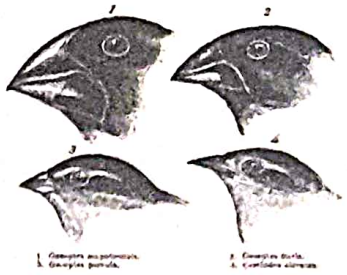


Image credit: "Darwin's finches," by John Gould (public domain).

Darwin didn't figure all of this out on his trip. In fact, he didn't even realize all the finches were related but distinct species until he showed his specimens to a skilled ornithologist (bird biologist) years later[3]! Gradually, however, he came up with an idea that could explain the pattern of related but different finches.

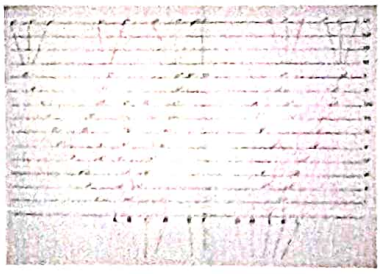
According to Darwin's idea, this pattern would make sense if the Galápagos Islands had long ago been populated by birds from the neighboring mainland. On each island, the finches might have gradually adapted to local conditions (over many generations and long periods of time). This process could have led to the formation of one or more distinct species on each island.

If this idea was correct, though, *why* was it correct? What mechanism could explain how each finch population had acquired **adaptations**, or features that made it well-suited to its immediate environment? During his voyage, and in the years after, Darwin developed and refined a set of ideas that could explain the patterns he had observed during his voyage. In his book, *On the Origin of Species*, Darwin outlined his two key ideas: evolution and natural selection.

[Didn't Alfred Russel Wallace also come up with these ideas?]

Evolution

Darwin proposed that species can change over time, that new species come from pre-existing species, and that all species share a common ancestor. In this model, each species has its own unique set of heritable (genetic) differences from the common ancestor, which have accumulated gradually over very long time periods. Repeated branching events, in which new species split off from a common ancestor, produce a multi-level "tree" that links all living organisms.



Modern-day species appear at the top of the chart, while the ancestors from which they arose are shown lower in the chart. Image credit: "Darwin's tree of life," by Charles Darwin. Photograph by A. Kouprianov, public domain.

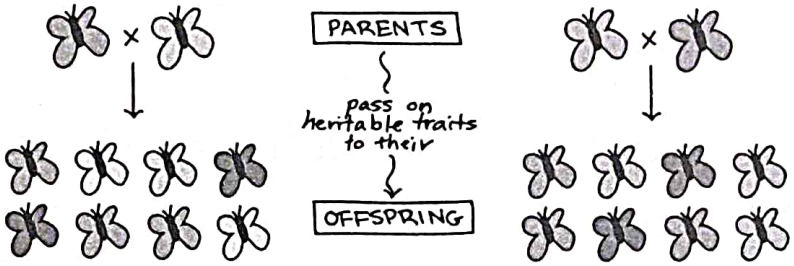
Darwin referred to this process, in which groups of organisms change in their heritable traits over generations, as “descent with modification." Today, we call it **evolution**. Darwin's sketch above illustrates his idea, showing how one species can branch into two over time, and how this process can repeat multiple times in the "family tree" of a group of related species.

Natural selection

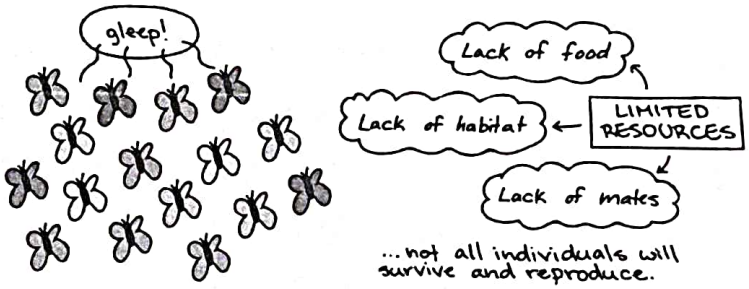
Importantly, Darwin didn't just propose that organisms evolved. If that had been the beginning and end of his theory, he wouldn't be in as many textbooks as he is today! Instead, Darwin also proposed a mechanism for evolution: **natural selection**. This mechanism was elegant and logical, and it explained how populations could evolve (undergo descent with modification) in such a way that they became better suited to their environments over time.

Darwin's concept of natural selection was based on several key observations:

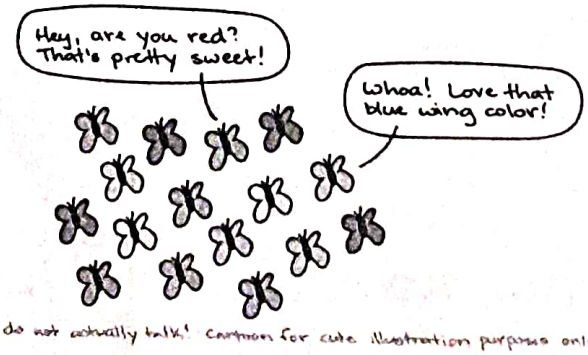
- **Traits are often heritable.** In living organisms, many characteristics are inherited, or passed from parent to offspring. (Darwin knew this was the case, even though he did not know that traits were inherited via genes.)



- **More offspring are produced than can survive.** Organisms are capable of producing more offspring than their environments can support. Thus, there is competition for limited resources in each generation.



- **Offspring vary in their heritable traits.** The offspring in any generation will be slightly different from one another in their traits (color, size, shape, etc.), and many of these features will be heritable.



Based on these simple observations, Darwin concluded the following:

- In a population, some individuals will have inherited traits that help them survive and reproduce (given the conditions of the environment, such as the predators and food sources present). The individuals with the helpful traits will leave more offspring in the next generation than their peers, since the traits make them more effective at surviving and reproducing.

- Because the helpful traits are heritable, and because organisms with these traits leave more offspring, the traits will tend to become more common (present in a larger fraction of the population) in the next generation.

- Over generations, the population will become **adapted** to its environment (as individuals with traits helpful in that environment have consistently greater reproductive success than their peers).

Darwin's model of evolution by natural selection allowed him to explain the patterns he had seen during his travels. For instance, if the Galápagos finch species shared a common ancestor, it made sense that they should broadly resemble one another (and mainland finches, who likely shared that common ancestor). If groups of finches had been isolated on separate islands for many generations, however, each group would have been exposed to a different environment in which different heritable traits might have been favored, such as different sizes and shapes of beaks for using different food sources. These factors could have led to the formation of distinct species on each island.

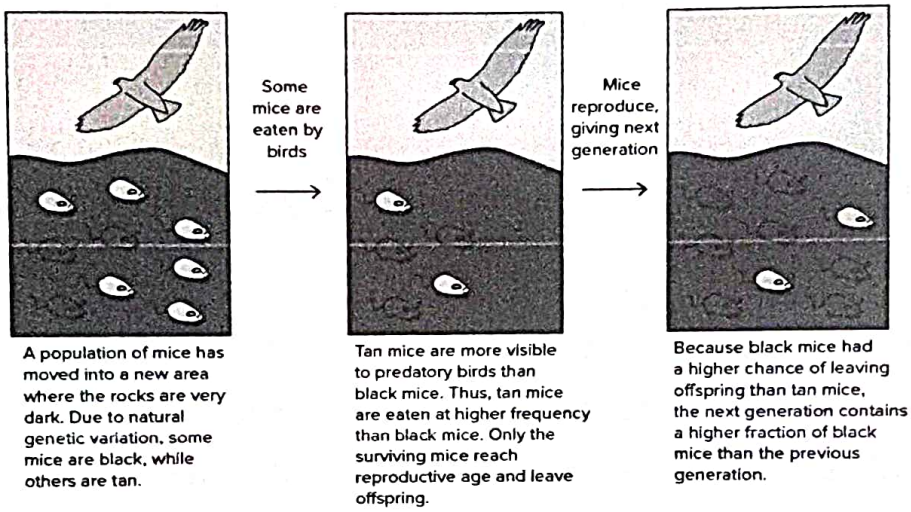
[Wait, how would that work?]

Example: How natural selection can work

To make natural selection more concrete, let's consider a simplified, hypothetical example. In this example, a group of mice with heritable variation in fur color (black vs. tan) has just moved into a new area where

the rocks are black. This environment features hawks, which like to eat mice and can see the tan ones more easily than the black ones against the black rock.

Because the hawks can see and catch the tan mice more easily, a relatively large fraction of the tan mice are eaten, while a much smaller fraction of the black mice are eaten. If we look at the ratio of black mice to tan mice in the surviving ("not-eaten") group, it will be higher than in the starting population.



Schematic based on similar schematic in Reece et al. [4]. Hawk outline traced from "Black and white line art drawing of Swainson hawk bird in flight," by Kerris Paul (public domain).

Fur color is a heritable trait (one that can be passed from parent to child). So, the increased fraction of black mice in the surviving group means an increased fraction of black baby mice in the next generation. After several generations of selection, the population might be made up almost entirely of black mice. This change in the heritable features of the population is an example of evolution.

[What genes and alleles are we assuming here?]

Key points about natural selection

When I was first learning about natural selection, I had some questions (and misconceptions!) about how it worked. Here are explanations about some potentially confusing points, which may help you get a better sense of how, when, and why natural selection takes place.

Natural selection depends on the environment

Natural selection doesn't favor traits that are somehow inherently superior. Instead, it favors traits that are beneficial (that is, help an organism survive and reproduce more effectively than its peers) in a specific environment. Traits that are helpful in one environment might actually be harmful in another. *[Example]*

Natural selection acts on existing heritable variation

Natural selection needs some starting material, and that starting material is heritable variation. For natural selection to act on a feature, there must already be variation (differences among individuals) for that feature. Also, the differences have to be heritable, determined by the organisms' genes. *[Example]*

Heritable variation comes from random mutations

The original source of the new gene variants that produce new heritable traits, such as fur colors, is random mutation (changes in DNA sequence). Random mutations that are passed on to offspring typically occur in the germline, or sperm and egg cell lineage, of organisms. Sexual reproduction "mixes and matches" gene variants to make more variation.
[Do organisms mutate on purpose?]

Natural selection and the evolution of species

Let's take a step back and consider how natural selection fits in with Darwin's broader vision of evolution, one in which all living things share a

common ancestor and are descended from that ancestor in a huge, branching tree. What is happening at each of those branch points?

In the example of Darwin's finches, we saw that groups in a single population may become isolated from one another by geographical barriers, such as ocean surrounding islands, or by other mechanisms. Once isolated, the groups can no longer interbreed and are exposed to different environments. In each environment, natural selection is likely to favor different traits (and other evolutionary forces, such as random drift, may also operate separately on the groups). Over many generations, differences in heritable traits can accumulate between the groups, to the extent that they are considered separate species.

Based on various lines of evidence, scientists think that this type of process has repeated many, many times during the history of life on Earth. Evolution by natural selection and other mechanisms underlies the incredible diversity of present-day life forms, and the action of natural selection can explain the fit between present-day organisms and their environments.

TOPIC : Evolution

Guest lecture

by

Dr. N. Srinivas rao garu.

Guest lecture 26/8/2019

A.S.D Govt. Degree college for women (A).

No	Name of the student	class/Group	signature
7	A. Devi	I^st BSC CBZ	A. Devi
8	Sk. Basher	I^st BSC CBZ	Sk. Basher
9	M. Sobhi	I^st BSC CBZ	M. Sobhi
10	G. Ankitha	I^st BSC CBZ	G. Ankitha
1	P. Jaya Shiba	I^st BSC CBZ	P. Jaya Shila
2	Ch. Devi	I^st BSC CBZ	Ch. Devi
3	Sk. Kavishma	I^st BSC CBZ	Sk. Kavishma
4	D. eswari kumari	I^st BSC CBZ	D. eswari kumari
5	J. Priyanka	I^st BSC CBZ	J. Priyanka
6	M. mallishwari	I^st BSC CBZ	M. mallishwari
7	S. Devi	I^st BSC CBZ	S. Devi
8	R. Mamatha	I^st BSC CBZ	R. Mamatha
9	M. Vijayalakshmi	I^st BSC CBZ	M. Vijayalakshmi
10	K. Java kumari	I^st BSC CBZ	K. Java kumari
11	D. Mahalakshmi	I^st BSC CBZ	D. Mahalakshmi
12	K. Vatsavi	II^nd Bsc [CZAQT]	K. Vatsavi
13	M. Sudha Mounika	II^nd Bsc [CZAQT]	M. Sudha
14	M. Anusha	II^nd Bsc [CZAQT]	M. Anusha
15.	V. Anusha	II^nd Bsc [CZAQT]	V. Anusha.
16	G. Bhanu Deepthi	II^nd Bsc [CZAQT]	G. Bhanu Deepthi
17	E. Lavanya	II^nd Bsc [CZAQT]	E. Lavanya
18	E. Karuna	II^nd Bsc [CZAQT]	E. Karuna
19	B. Mounika	II^nd Bsc [CZAQT]	B. Mounika
20	K. Devi	II^nd Bsc [CZAQT]	K. Devi