Basic Course on Ornithology
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Introduction to Ornithology

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Welcome to the basic course in Ornithology. Ornithology is of course the formal study of birds and to start things off here is a very brief introduction to birds and to ornithology. This is not to give you an overview of ornithology as a whole that you will receive in the various detailed lectures in this course. Rather it is to whet your appetite for birds and bird study and to set the stage for what is to follow.

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Let us begin with asking the first question what are birds anyway? Famed ornithologist Salim Ali had a concise definition. He said that the simplest way to describe them would be as "feathered bipeds"- animals that walk on two legs and have feathers.

If we want to go a little further with physiology and morphology, we could say that they are vertebrates that generate their own body heat, have feathers, have beaks without teeth, a heart with four chambers and so on.

But I like to describe them as the only dinosaurs that still roam the earth.

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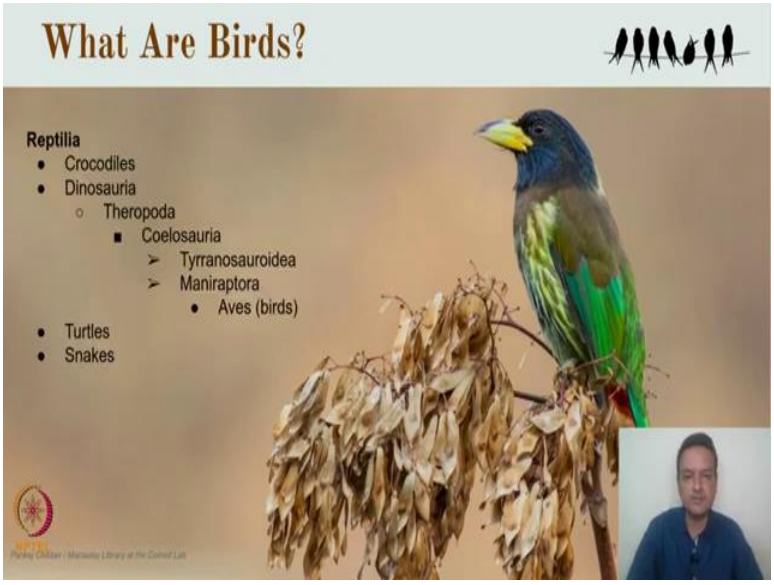

That's right the dinosaurs didn't go extinct at least not completely. There was a group of dinosaurs called Theropods, which had hollow bones and three forward pointing toes. Theropods can be divided into four groups and birds evolved from one of these groups.

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The same group that includes Tyrannosaurus and Velociraptor.

This means that birds are more closely related to T.rex than they are to crocodiles and snakes and are even more distantly related from mammals. So, you can go on and tell your friends and family that dinosaurs didn't go extinct. Instead, they are everywhere hopping and flying all around us as innocent as can be!

By the way, this means that if you study birds and want to impress people, instead of ornithology you can say you study dinosaur biology and then of course you'll have their full attention as you explain what you mean!

So, let us look at some features of birds that make them particularly interesting to people.

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First, birds are everywhere! Again, quoting Salim Ali, it is hard to imagine a square mile of India that doesn't have at least a few birds - including the deserts of Rajasthan and the frozen mountains of the high altitudes. And perhaps this is true nearly worldwide. Here is a map depicting the number of bird species found in different parts of the world with purple indicating the most species and white the fewest.

Closer to home if you stand in your neighborhood and count birds for 15 minutes you will likely count 15 or 20 individual birds or possibly more.

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Next, birds are diverse. There are many species around us. Again, in our 15 minutes outside your home, you are likely to see 10 or more species and you may be lucky to live in a place where that number might be 20 or 30 or more. Over 1,340 species of birds have been recorded in India, some 12 percent of the roughly 10,800 species worldwide.

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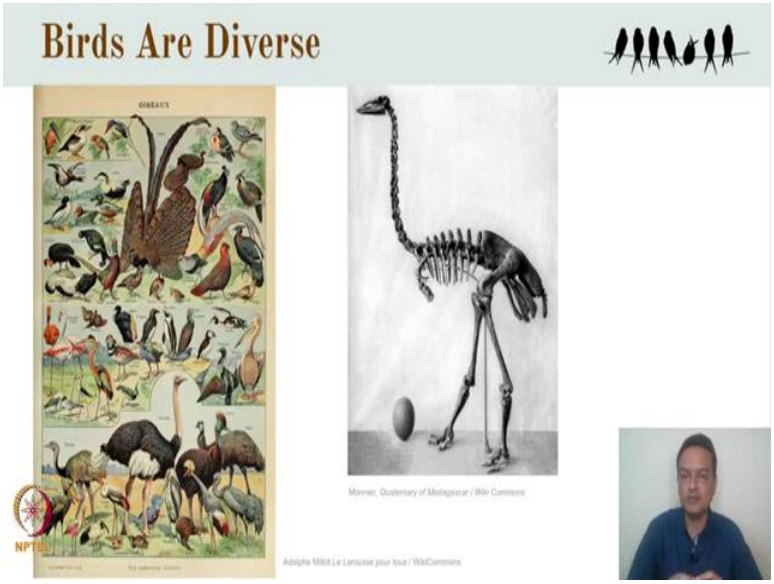

And these species come in diverse shapes and colors and sizes. As you can see from this illustration from 1909. As a demonstration of the variation in size, the smallest bird, the Bee hummingbird is about the size of the eye of the largest living bird the Ostrich. And that is just today

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the heaviest extinct bird the elephant bird of Madagascar weighed some three times as much as an Ostrich does.

And here you can see how dinosaur-like its skeleton is. So, because they are everywhere, because they are so diverse and because they can fly, people have been fascinated by birds for a long long time.

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In Greek mythology, Icarus and his father constructed wings made of feathers and wax. But despite his father's warnings, Icarus flew too close to the Sun, the wax melted and the wings disintegrated. Clearly flight is something of particular interest to us.

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Closer to home birds feature prominently in texts, stories and art. You can see them in the pottery of the Indus valley civilization; they feature in ancient texts, myths and fables, in tribal folktales, painting and craft; and they are the inspiration for many contemporary stories, songs and art as well.

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There are also a number of beliefs about birds such as that crows carry food back to our ancestors or themselves embody the souls of the departed.

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For example, in the legendary faithfulness of Sarus Cranes to each other, we document seasonal patterns like how the Cuckoo or Chatak is considered the herald of the monsoon in central and northern India, a belief also corroborated by modern research and we listen carefully to their sounds as shown by how the Indian Pitta is called ‘Aarumani Kuruvi’ in Tamil which means 6 o'clock bird and sure enough that’s the time it calls.

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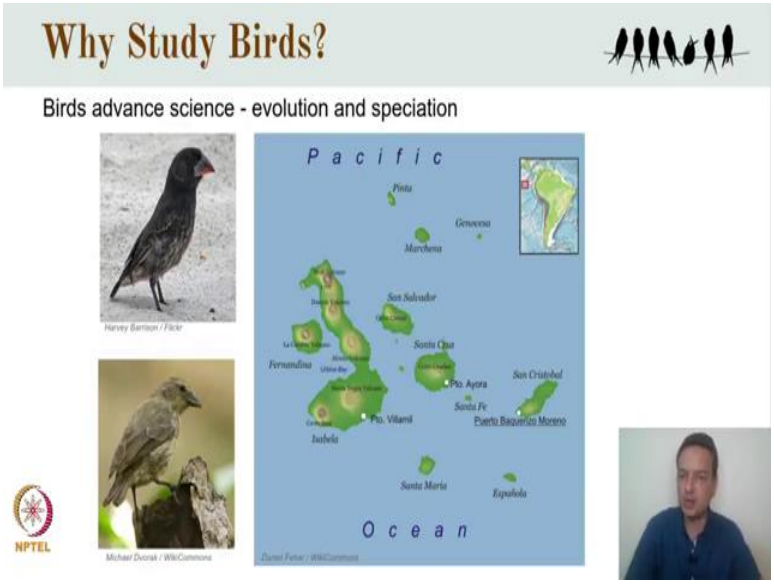

Apart from all these, there are many practical reasons to study birds in the formal sense as ornithologists while thinking about the broad signs of biology birds have helped generate insights and advance understanding in several ways. There are too many examples for a comprehensive list but here is a brief selection.

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Finches on the Galapagos islands have contributed to our present understanding of how an ancestral species could split into several daughter species and the role of ecology and geography in this process.

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Observations on birds prompted some of the first insights into how wild populations are regulated and how competition between related species influences, which set of species can co-exist in a single community.

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Birds were key in the development of ideas of trade-offs between costs and benefits of different options and how these trade-offs influence the evolution of reproductive decisions like clutch size, of foraging decisions like choosing what to eat and social behavior like whether to forage in or nest in a group or not.

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Many bird species are social and our current understanding of what shapes social behavior and animals is influenced by studies of altruism, kinship and cooperation versus competition in bird groups.

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Birds have also been key model systems to study such fascinating topics as inherited versus learnt components of voice - in this case song; or navigation and orientation while traveling long distances - in this case during migration; or the hormonal and neurological underpinnings of seasonal changes for breeding and song production.

In these ways and many others birds have helped us better understand the natural world.

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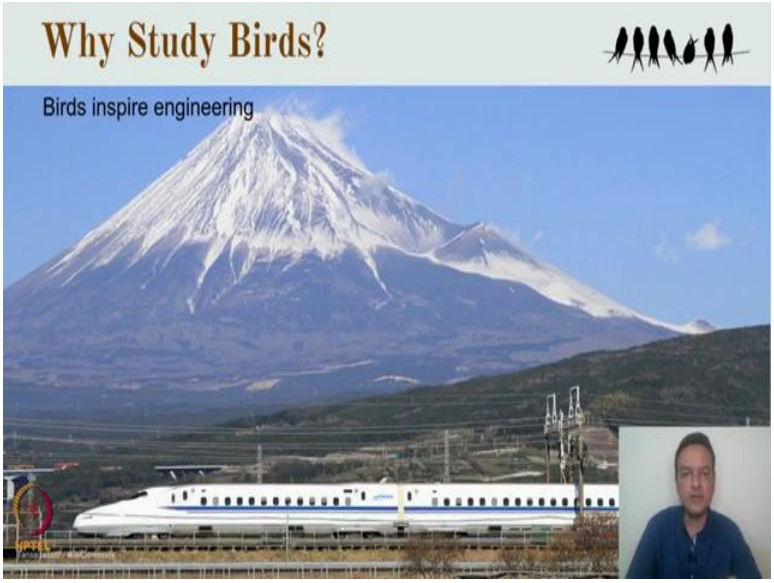

Engineers are also increasingly turning to birds for inspiration in solving problems in the real world. One famous example is that of a re-design of the Japanese bullet train. Earlier models of the bullet train would cause a sonic boom when they emerged from tunnels, caused by extremely compressed air suddenly expanding when it got pushed out of the tunnel.

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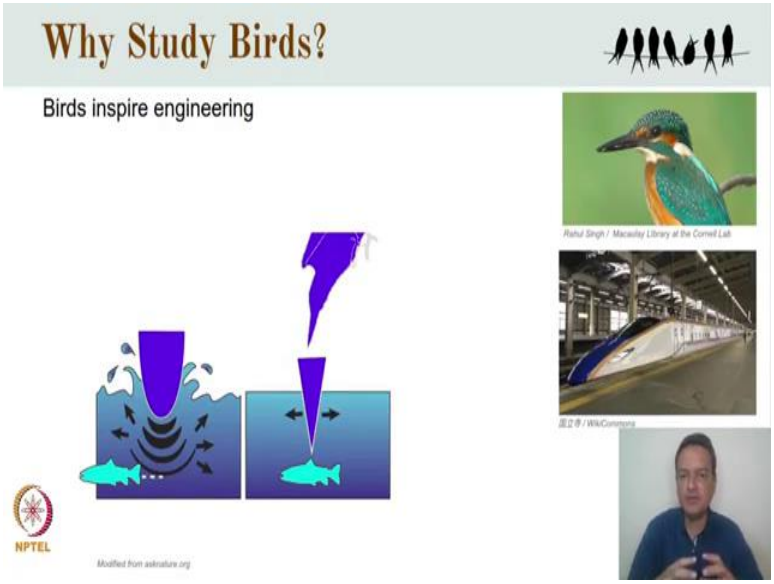

Inspired by how Kingfishers dive into water with minimal disturbance; engineers reshaped the nose of the train adding a long beak-like extension, which decreased noise and saved on energy as well.

And there are many further inspirations under development, for example, drawing from the design of the hollow bones of birds to design strong yet light structures or examining the details of Owl feathers to decrease the noise made by airplane wings and other moving elements.

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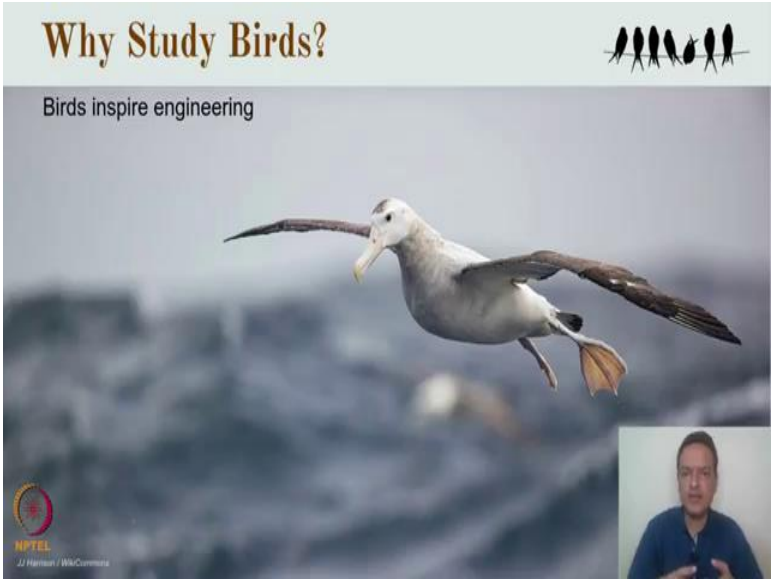

The wings of planes and birds of course, share the same essential property of being an aerofoil such that air above the wing has to pass over a greater distance and more rapidly than below the wing. This lowers the air pressure above the wing and therefore generates lift. But birds have many other tricks up their sleeves, including changing the shape of the wing by how much they stretch it, depending on whether they want to go slower or faster, or generate more or less lift. With this as inspiration engineers are now looking at designing adaptable wings for aircraft that can change shape as needed.

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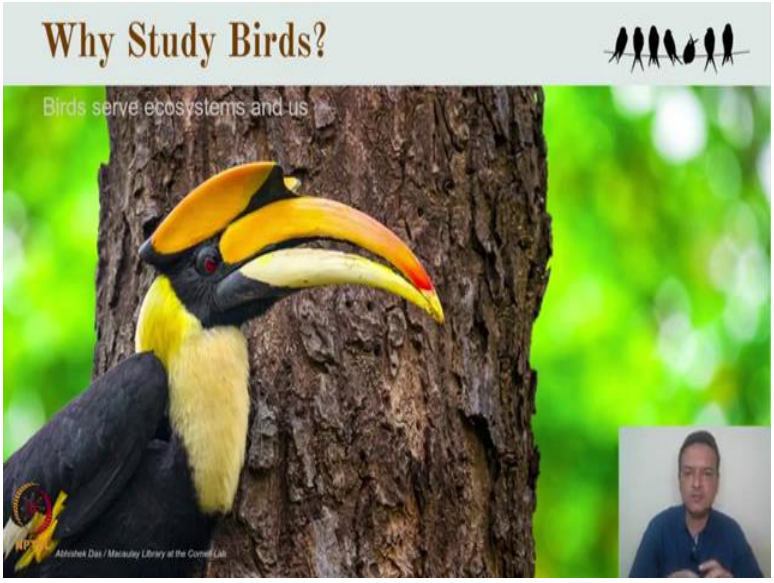

Within various kinds of ecosystems, birds are of considerable practical utility. In forests, large frugivores like hornbills are crucial for the dispersal of large-seeded fruit and therefore are known as ‘farmers of the forest’. Similarly, a variety of nectar-eating birds like sunbirds and hummingbirds, play an important role in pollination.

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In agricultural ecosystems, there is evidence that insect-eating birds can help in pest control and this kind of service might be even stronger for birds of prey like Owls and Hawks, whose presence on farms appears to reduce rodent activity and numbers, thereby increasing yields.

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And finally, birds serve as excellent indicators of a changing world by tracking how they are doing we can understand the state of nature more broadly. Of course, one could use other creatures as well, but birds turn out to be particularly convenient, because they are large, they are prominent, relatively easily found and identifiable and a large number of people worldwide are fascinated by them. By observing birds, birdwatchers over the world are contributing to some of the largest biodiversity monitoring projects that exist and these kinds of ‘citizen science’ efforts are rapidly expanding.

In this way, birds have provided clear-early warning signs of such changes as habitat alteration, global heating and the spread of environmental toxins.

Much of this discussion applies to ornithology in India as well. So, let us briefly survey some aspects of the history and development of ornithology in this country.

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Observations on birds in India start with the very first texts that are available to us and it is said that up to 250 Sanskrit words have been identified that refer to known species of birds. The example here is thought to be the very first documentation anywhere in the world of the phenomenon of brood-parasitism in which birds of one species lay their eggs in the nest of another species, which then acts as foster parents.

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Several of the Mughal emperors were keen naturalists and made close observations of the birds and other wildlife around them and also commissioned paintings. Foremost among these was

Jahangir whose court artist Ustad Mansur painted one of only two known illustrations of the Dodo from a live specimen before the species became extinct 50 years later and also the first known painting of a Siberian Crane. Notice how luminous these paintings are and also how true to life! Jahangir also wrote his own memoirs, which were full of natural history observations including a description of the brood parasitic habits of the Koel.

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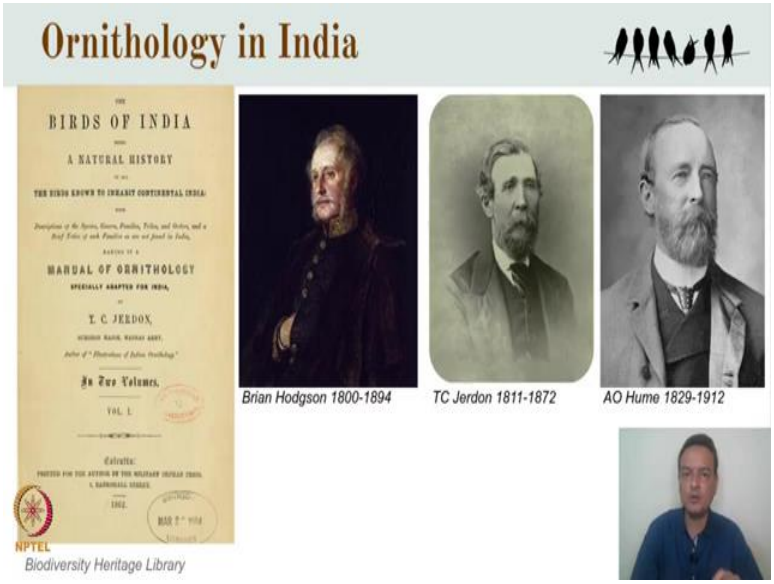

The signs of ornithology, as we understand it today started in colonial times and many consider TC Jerdon's 1862 book ‘Birds of India’ to be the first significant milestone in the development of Indian ornithology.

Until the first decades of the 1900s most people contributing to Indian ornithology were European, primarily British. Their efforts revolved largely around describing birds and understanding their distribution. And this was done mostly through collecting specimens.

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Notably, many of these contributors were not professionals, in that they did not make their living from ornithology or science. For example, Hodgson was a government official, Jerdon was a doctor and Hume was a civil servant also famous by the way for his fierce criticisms of the colonial government and his work towards political reform.

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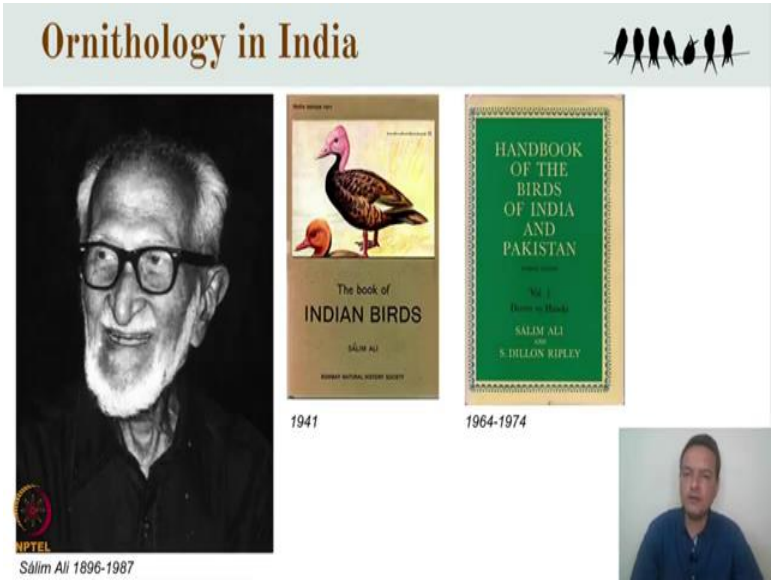

From the early 1900s onwards, we start seeing more Indian ornithologists, Salim Ali being one of the first among them. There was also a clear shift in focus from specimen collection to observations of living birds, to better understand their habitat preferences and their behavior.

And this resulted in two remarkable books - 'The Book of Indian Birds' which began to popularize birds and bird watching among the larger public and the 'Handbook of the Birds of India and Pakistan', which sought to gather the available naturalistic information of each species into a single place.

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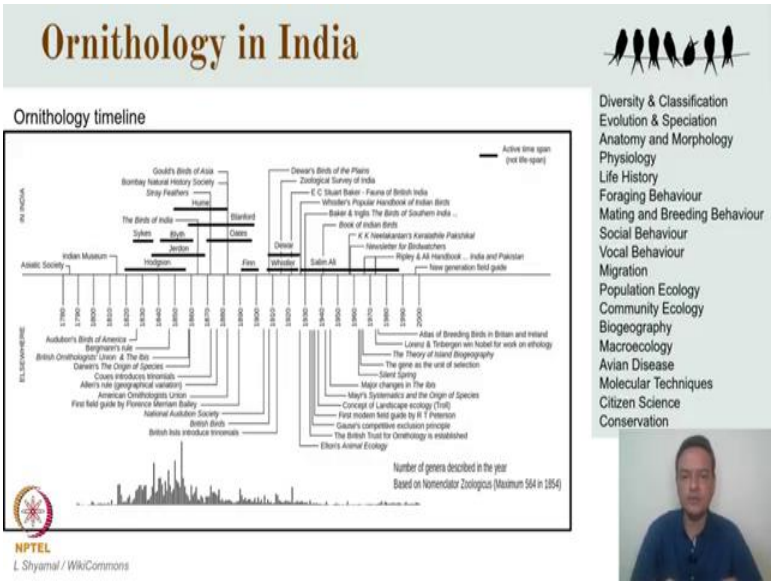

This very useful timeline shows some of the major developments in contemporary ornithology over roughly the past 200 years, including the span of time for which various British naturalists were active, as well as the founding of major institutions and the publication of important books.

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And over the past 50 years or so we can see the emergence of various sub-disciplines of ornithology in India most of which apply to any taxon of course not just birds. These are the sorts of topics that will be covered in any overview of ornithology. They include classical topics that are investigated for hundreds of years, like anatomy and diversity, classification and biogeography, all the way to topics that have come into prominence in recent years, including macroecology, disease biology and citizen science.

And they also include extremely recent methods like the use of DNA technology to understand various aspects of birds. This is the list of topics that we will cover in this course - a quick and wide sweep of virtually all aspects of ornithology, what the current understanding is in these various topics as well as an overview of how researchers actually study birds

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With increasing interest in birds among the public at large more research in ornithology is being done than ever before and more people are involved, scientists and non-scientists alike. It is a very exciting time to learn more about the living dinosaurs that roam among us and we hope that you enjoy this course in basic ornithology.