

MY 20-YEAR RESEARCH JOURNEY FOR A NEW SPECIES OF SPIDERS, OR HOW TO COME TO A NEW DISCOVERY

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From time to time students ask me whether it is difficult to discover new species of organisms on our planet. To answer this question, I have decided to tell my story of how I discovered a new species of spider that I have dedicated to Eugenio María de Hostos.

This story begins in 1986 in the Betpak-Dala desert of Kazakhstan, a country in Central Asia. I participated on a research expedition with a group of colleagues from the Kazakhstan Institute of Zoology. During this expedition we collected spiders in the early morning, in late evening and often during the night. The midday temperatures typically reach 122°F in the Betpak-Dala desert and it was virtually impossible to collect spiders or carry out any activities during this time. Therefore, we spent the midday in the shade, writing in our diaries and having a slow chats. One time, I noticed that some spiders were running extremely fast in the desert even in the midday. We caught some of them - they were males with slender bodies and long legs. These spiders belong to the group of spiders scientists call ground spiders or Gnaphosidae in Latin. Ground spiders do not produce webs; instead they live on the ground, under rocks, under logs, in leaf litter. Sometimes these spiders will retreat into the ground, or a burrow. The males that we collected in the Betpak-Dala desert had long legs. The last segment of a leg is called the tarsus or “foot”. The tarsus has two claws, and the claws of these particular males were unusually long, almost half as long as a tarsus. It turns out that these spiders actually walked on these claws and not on “foot” to avoid burning the soles of their feet on the unbearably hot sand. An example of this would be you walking on a Caribbean beach under the scorching sun, where the sand is extremely hot and to avoid the heat, rising up on your nails. Of course, you would need to be very strong and to have very long nails. All the males we collected in Betpak-Dala had legs with long claws and they used these claws to walk on the hot sand - this is quite unusual for spiders. Additionally, these males looked completely different from all known spiders in the entire Central Asian region. It was definitely a new species of spiders and also, actually, - a new genus. I named this spider the “long claw” spider.

However, the problem with the males that we collected was that all of them were young spiders. Scientists call spiders at this stage ‘immature’, and this means that they molt or change skin a few times before becoming a mature adult. An adult spider is ready for reproduction, with completely developed reproductive organs inside its body and secondary reproductive organs outside it. Why is it important to have adult specimens to study spiders? Most of the features used to identify spiders are the structure of secondary reproductive organs, which are called palps in males and epigyna in females. Immature spiders do not have secondary reproductive organs, which develop only after a spider’s fifth molt. So, because all males that we had collected were immature, we searched hard for adult males but we could not find any. Since that summer in 1986, I have been trying to find adult males and females of this spider, because I knew that I was dealing with something exceptional, most probably a new genus and a new species of desert spiders. I have not had a chance to return to the Betpak-Dala desert again but I regularly ask my colleagues who collect spiders in the deserts of Central Asia to keep their eyes open for this spider. After more than 20 years of collecting, I have gathered around 15 adult males from different regions of Central Asia.

How does a researcher find new material for his/her studies? Of course, s/he can travel to places that the target organism is likely to occur. Although a well-known method, this method is a more difficult method than one might think because the scientist has to be in a right place at right time. Furthermore, as a rule, all research expeditions require a lot of time and sufficient funding. Therefore, we often try to find other ways to gain access to research materials from a particular place. You can ask your colleagues collecting in a region of interest to bring you sample data. Or – you have available research material in museum collections. As a rule, big museums such as The American Museum of Natural History in New York or The Zoological Institute of the Russian Academy of Sciences in St. Petersburg have enormous research collections. These collections have millions of different animals, including insects, spiders, mollusks, fishes, reptiles, birds, mammals, etc. Research collections are located in special storage areas of the museum and regular visitors rarely get to see them. But who collects these research materials and why preserved in storage rooms? These collections have been compiled by different scientists and, quite often, by ordinary people. Sometimes, big museums organize research expeditions to different unexplored parts of the world to collect all animals and plants and to bring them back to the museum. As a rule, all collected materials are sorted to the family or generic level group of organisms. As such, they are stored in research collections so that scientists can study particular groups of living organisms. Scientists who study animals are called zoologists, and they are called taxonomists if they study the classification of living organisms. Typically, each taxonomist is an expert in a particular group of living organisms. And if a scientist who studies spiders needs to examine some spider specimens, he can visit a research collection and check the spiders from a particular group of spiders, such as ground spiders or wolf spiders, and from regions all over the world.

For more than 20 years, I have been examining all the spider collections from the deserts of Central Asia. During this time, I have found a few males of this new spider that I called “long claw” in different research collections. Some of the male specimens have been sent to me by my colleagues. Once I had a sufficient number of adult males for description – I was sure that they were definitely samples of a new genus and a new species of a spider. However, I still needed an adult female spider as well! Without the

description of a female spider, the entire description is not complete, in part, because a female can appear as a completely different spider. In summer of 2008 I was at the Zoological Institute in St. Petersburg for almost two weeks, sorting specimens in the research collection of the museum and looking for a female of the “long claw” spider. I had already briefly checked this collection without finding the “long claw” spider. This time everything was almost the same, however, I decided to check specimens that had been recently sorted and identified by a research assistant of the museum. After a few hours of checking collection, I found a vial, full of “long claw” spiders. I opened the vial and found 24 adult males inside and – BINGO! Two adult females!! Males of a “long claw” spider are light yellow in color with a slender body and very long legs. I expected to find the female as a “slim lady with long legs” as well, but the “lady” was completely opposite of a male: females had a large body, were fat, and had very short and spiny legs. Nonetheless, it was clear that all of them were of the same species, because generally they were quite similar and were collected around the same place. When I found the females, I understood why it had been taken so long to find them. Females do not travel much. Instead they dig burrows and live in them. The bodily features of the females tell us about them. Their short and spiny legs are clearly modified for digging and living in a narrow burrow. The males, on the other hand, travel and look for females’ burrows – therefore, they have long legs and slender bodies for easier traveling and keeping their bodies far from the hot ground.

My research journey for more than 20 years was coming to an end. Now my next step is to provide a scientific name for these spiders. This involves making a scientific description of all anatomical parts of the species, sketching secondary reproductive organs and publishing the results of my research in a peer-reviewed journal. Only when a new spider has an official “citizenship” in the research community, will it be a new known spider. I was very excited about the name I would give to the long-claw spider. As a researcher who has found a new genus and a new species, I am entitled to give any new name to a “long claw” spider, but this name must be in Latin. I thought because it had taken me more than 20 years to find this spider and the discovery happened when I was already teaching at Hostos Community College – that this was a sign. I decided to honour the name of Eugenio María de Hostos with this discovery. Hostos traveled to different countries, where established educational systems. He discovered new worlds of knowledge that he shared with his students. So, I thought I would dedicate the name of the discovered spiders to this great man. Finally, when the official description of a “long claw” spider is published in a research journal, these newly discovered spiders will be named in his honor - Hostos and Eugenio.

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