What is A Species Anyway?!

By Chuck Louch, PTMSC Docent

You’d think that biologists would have answered this question long ago but they haven’t; it’s still a source of contention. And it’s not a trivial question because the decision about whether or not to protect a local population of plants or animals depends on whether it is a “true species” or merely a local variety of a more widespread species. This is a very complex and contentious subject so, as you can imagine, biologists have enunciated many ideas about what a species is. In this and the following essay, I will attempt to describe as simply as possible the three most widely accepted of these ideas.

The earliest descriptions of species were based almost entirely on anatomical features and led to the so-called Morphological Species Concept (MSC), which is essentially the one followed by Linnaeus. For example, he used the sexual structures of flowers, among other things, to help classify plants. Incidentally, polite society of his time considered flowers to be the symbol of purity so the idea that they had sex was horrifying to them.

In its simplest form, the MSC states that a species is a group of organisms that share a unique combination of morphological features distinguishing it from all other groups. Put another way, this is not as simple as it sounds because there is always considerable variation within any group, no two individuals being identical. Therefore, someone has to decide how much variation can be tolerated when defining a new species and this always involves some degree of subjectivity. In order to reduce this subjectivity as much as possible a formal protocol must be followed when proposing a new species. Thus, when a biologist describes a new species he or she deposits a reference specimen, called a “holotype,” in the research collection of a museum along with a series of specimens to represent variations within the species due to age, sex, and regional variation. This collection can then be referred to by anyone working with this or similar species. Also, a detailed description of the new species, which may include features such as behavior, physiological characteristics, and geographical distribution, is published in a professional journal where people can refer to it.

The MSC is the one we use when identifying a plant or animal by comparing it with written descriptions and pictures in a field guide or when using a taxonomic key. It is important to paleontologists since they usually can’t study behavioral or genetic traits but only physical remains. So it is of great practical usefulness. But it’s weakness is that it treats species as static, unchanging entities rather than products and sources of evolutionary change. It says nothing about how species arise or change over time. Furthermore, despite all attempts to eliminate subjectivity, it is always there. Those who can tolerate a greater amount of diversity within their species are called “lumpers” while those with a lower toleration are “splitters.” If you’re a birder who keeps a life list you probably love the latter and hate the former.

After Charles Darwin upset the apple cart by showing that species are not static entities but are continually changing and giving rise to new forms, biologists felt the need for a new species concept—one that accommodated these new ideas. And so, the Biological Species Concept (BSC) was enunciated in 1942 by the population geneticist, Ernst Mayr. He stated: “Species are groups of actually or potentially interbreeding natural populations which are reproductively isolated from other such groups.” This definition takes into account the fact that in nature many species may be broken up by geographic barriers into discrete populations that could interbreed if the barriers were removed. Thus, Siberian tigers would interbreed with Bengal tigers if only they could get together so they therefore belong to the same species.

Interbreeding means that individuals of two populations can mate freely with one another and produce fully fertile offspring. … continued on page 3
Fort Worden Eagles Update: Kah and Tai

As promised, here’s the update on our local nesting eagle pair, Kah and Tai. This year they have surprised us with a couple of changes in their usually predictable behavior. They are raising two chicks, instead of the three they normally raise. Kah is a female of the year, which is the first time in the 15 years that we have been monitoring them that this has occurred. Kah is also a second-year bird, which means there will be a first-time mom in the group. This year they have surprised us with a couple of changes in their behavior and they have raised two chicks instead of the three they normally raise.

On April 24th, Kah and Tai began incubating, setting the stage for the chicks to hatch. The chicks are due to hatch in mid-May, and the family will be active in the area for the next few weeks. The chicks will fledge in July or August, depending on their maturity, but look at body shape. The opalescent has a very traditional slug-shaped body with well-defined oral tentacles, while the cerasus has a more flower-like appearance with a large, fleshy, red-colored oral tentacle. The cerasus is a more common species in the area, and is often found in coastal areas.

Thank you to everyone I have had the pleasure of getting to know. I have learned a tremendous amount in my two and a half months here. The Marine Science Center is an amazing place to work, and I hope to stay in close contact.

—Alison Ward

NHE UPDATE

Summer is upon us! We will soon be opening our doors six days a week, 11 am to 5 pm, which means that we need volunteers. Almost every day of the week is available (except Tuesday) so we should fit into your schedule quite nicely! You can find sign-up sheets for both buildings here at the Fort Worden State Park office, the Fort Worden Park office, or the Seattle branch of the FAA. There were no further helicopter incidents that day.

Thank you to all you wonderful volunteers!

—Anna Brownstein
What is a Species … continued from page 1

There are two advantages to this definition. First, it provides a clear cut, apparently unambiguous criterion for deciding whether populations that differ from one another in some way belong to the same or different species and second, it is derived from one of the more important theories of how speciation occurs. Put very simply, this theory states that if two or more populations of a particular species become segregated from each other, as by geographical barriers, so that no gene exchange can occur between them (they can’t interbreed) they will diverge from one another over time through the collection of genetic mutations and natural selection, until eventually they will be unable to interbreed even if the original barriers disappear. The populations will be reproductively isolated and so have become different species by the definition. This might conceivably happen to Siberian and Bengal tigers in time, provided they aren’t wiped out beforehand.

Once established, reproductive isolation may be maintained by a variety of mechanisms. The most basic of these operates at the cellular level when the two sets of chromosomes possessed by a hybrid individual, one set from each parent, are so different from each other that the normal process of gamete production can’t occur and the individual is sterile. Thus in a mule, one set of its chromosomes comes from its equine parent and the other set from its donkey parent so that “in the world of mules there are no rules.” Differences in courtship behavior may prevent individuals of different species from respond appropriately to each other, or the species may breed at different times, or in different habitats, or they may be anatomically incompatible. These are just a few of a large number of factors that might bring about reproductive isolation.

Although the BSC is conceptually pleasing to biologists and is the dominant concept today, it does have its problems. Most importantly, it can apply the reproductive genetic mechanism by means of sexual reproduction and can’t apply to asexually reproducing forms such as bacteria and some plants such as the common dandelion (Taraxacum officinale). The former reproduce by simple cell division while the latter does so by means of unfertilized eggs, a process called parthenogenesis. In either case, individuals cannot exchange genes with each other so that a population consists of many clones, each genetically isolated from the others. Is each of these clones a different species? Indeed, is each individual a distinct species? How many species of dandelion do you have in your lawn?

Because of this problem, and others that I will discuss in my next essay, some biologists have abandoned the BSC and have turned to other species concepts, one of which I will discuss next time. So stay tuned!

From the Director …

Welcome to New Staff

New! Not exactly … The PTMSC is thrilled to have Judy D’Amore back on staff. In addition to being a founder in 1982, Judy was the first paid seasonal naturalist ever to work at the PTMSC. Between teaching contracts in Kitsap and Jefferson Counties, serving in the Peace Corps in Panama, completing her Masters program at the University of Washington and developing the original education program for the Menzie Centers, Judy has stayed active with the PTMSC as a volunteer, consultant and devoted friend.

In her new position, Judy serves as lead educator for the Natural History program — developing classes for school students, interpreting the Fort Worden State Park site for visitors, designing comprehensive trainings for K-12 teachers and providing training opportunities for volunteers and docs. She’ll also continue fostering our partnership with Burke Museum curators, regional scientists and agency staff to ensure that we’re incorporating the most recent science and technology into our programs.

The PTMSC has received funding to participate in a national Museum Assessment Program, MAP, focusing on governance. A governance assessment will help the Board of Directors, Advisory Board and Executive Director examine structure, roles and responsibilities. It will enhance our ability to advance the organization’s mission and engage in effective planning. The assessment has three parts: self-study, peer review and implementation.

This will be our second experience with the Institute of Museum and Library Services MAP program. We participated in an assessment focusing on overall operation of the PTMSC in 1997–98. That experience prepared us for launching our capital project in 1999. It was an excellent professional development opportunity then and I know this new assessment will be equally valuable.

The timing couldn’t be better. We’ve expanded our facilities and programs, we’ve forged new partnerships, strengthened old ones and we have four new board members on the team. This is an opportune time to dig in and learn how we can be more effective in advancing the PTMSC.

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Museum Advancement and Excellence

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A summer event is being planned for new and returning volunteers. Brush up on your Natural History knowledge. We will do another round-robin with some of our expert docents and greeters in the NHE!

Volunteer opporunities

UPCOMING EVENTS/CLASSES

Saturday, June 12th: 9:30 am–noon Natural History Docents/Greeter Training for new and returning volunteers. Brush up on your Natural History knowledge. We will do another round-robin with some of our expert docents and greeters in the NHE!

Geology Study Group: Join the Geology Study Group every 2nd and 4th Tuesday of the month at 5:15 pm for their discussions at the NHE and feel free to join any of their field trips (next one scheduled for June 20th). Call Jim Oakland at 360-379-6561 or e-mail him at jhoakland@olympus.net.

Exhibit Docents and Greeters — With Summer Hours starting on June 16th (11:00 am–5:00 pm, Wednesday–Monday), we will need all you past, present and future docents and greeters to come sign up for some shifts! The volunteer shifts in both buildings are from 11 am–2 pm and 2–7 pm. It would be really helpful if volunteers could sign-up well in advance of your days of preference! You can do so by calling at 385-5582 ext. 112.

Low Tide Festival — As you probably know, this is a really big event for which over 190 volunteers come together. This year’s July 3rd Festivities are shaping up, thanks to the LTF committee, and now it is the time to start signing up for your area of interest — so check your calendars and let Jean know at 385-5582 ext. 112, when and how you can help!

Green Crab Surveys — Help trap green crabs in Sequim Bay, Discovery Bay, Hood Canal and both sides of the cut at Indian Island. If interested, contact: Ann Essinger of Nahkeeta Northwest Wildlife Services at 360-766-6008.

Welcome to New Staff
Rock Out at Camp this Summer!

Kids love the Port Townsend Marine Science Center camps, enjoying a hands-on-learning experience while exploring cool things about marine life and the Earth's history.

Marine Science Day Camp July 12-16 Ages 8–12
Campers are immersed in creative and scientific activities; looking for brittle stars, pulling a seine net through eelgrass beds to learn where young fish hide and observing microscop ic life that lives in the sea.

Marine Science Overnight Camp July 25–31 Ages 9–13
In addition to activities for the day camp, overnighters get to explore other marine ecosystems on the Olympic Peninsula. Field trips to bays, beaches, marine labs and creative projects give kids a chance to learn cool stuff about marine life.

Kids Will Rock Out with Rock ‘n Fossil Day Camp
July 2–6 Ages 9–14
Campers explore the geology of the shoreline and life histories of the animals living there. Kids get to build skeletons of marine mammals, learn about mysteries of the bluff and make connections between fossils and the animals of today.

For more information about any of these programs please call the Port Townsend Marine Science Center at 385-5582, go to the website at www.ptmsc.org or e-mail the Center at camps@ptmsc.org. Inspire your young scientist and create fun memories to last a lifetime!

NEW & RENEWING MEMBERS
Thanks! To our New & Continuing Members! The following folks have either joined or renewed their PTMSC membership since the Spring ‘04 OCTOPRESS was sent!

Port Townsend, WA 98368
532 Battery Way
Memorial Scholarship Fund
Seth Bender
social assistance for children from families of limited means to participate in these enrichment camps and reduce the barriers that economic hardship imposes. We are seeking contributions for the 2004 season. They can be sent to:

Seth Bender Memorial Summer Camp Scholarship Fund 2004 marks the PTMSC’s sixteenth summer camp season. Each year the PTMSC receives requests for financial assistance from families located throughout the Puget Sound area. To assist these families, in 2001 we established the Seth Bender Memorial Scholarship Fund, in memory of a young man who felt passionately about integrating nature in our daily lives.

This fund provides much needed financial assistance for children from families of limited means to participate in these enrichment camps and reduces the barriers that economic hardship imposes. We are seeking contributions for the 2004 season. They can be sent to:

Seth Bender Memorial Summer Camp Scholarship Fund
Port Townsend Marine Science Center
532 Battery Way
Port Townsend, WA 98368

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Port Townsend Marine Science Center 4th Annual Low Tide Fest Saturday, July 3rd, 9 am to 5 pm at the Center
— Beach walks every half hour — 9:15-10:15 — with Naturalists
— Fish-printing — bring your own t-shirts or purchase one here
— Sand sculpture — with hoes
— Gray whale skeleton construction
— Live music all day
— Geology bluff walks in the afternoon
— Marine and Natural History Exhibits
— Presenters relating to Life on the Edge throughout the day

Amazing details of sea creatures, unable to be seen by the naked eye, will be revealed through the use of micro imaging by Dr. Elaine Humphrey, Director of the Bio-imaging facility at the University of British Columbia. Find out about unusual jellies and flats that wash ashore on Washington Beaches from the Department of Fish and Wildlife’s Alan Rammer. Current problems involving shellfish will be explored by staff from the Point Whitney Shellfish Lab, who will also have two of their research boats tied up at the dock. As part of a SCUBA dive coordinated by Wes Nicholson of PNW Critter Watchers, you’ll have the opportunity to see the creatures that live below the surface near the pier that houses the Marine Exhibit.

For a complete schedule, visit www.ptmsc.org and click ‘Low Tide Fest.’