Observations of the Owl (19)

What's Sex?

Let's talk about sex! Delicate topic for a lot of you, I know. So maybe I should first make it quite clear that I will be revealing absolutely *nothing at all* about the intimate details of an owl's sex life here. Disappointed? Well, remember: curiosity killed the cat!

Interestingly, one of the first things which sprang to mind when thinking about how to tackle this topic, concerned *your* sex life. I once watched a rather stupid movie, having sneaked into the rafters of my favourite cinema, and no, it wasn't a porn movie! The movie was entitled "Everything You Always Wanted To Know About Sex, But Were Afraid to Ask". Which suggests that quite a lot *is known* about sex.

However, the opposite is actually the case. We don't even know exactly why nature invented sexual reproduction all those years ago. After all, asexual reproduction is much less costly: you don't need a second (male) sex; you don't need to produce huge germ cells; and yet it still clearly outnumbers sexual reproduction. The famous evolutionary biologist, John Maynard Smith, worked out, for example, that after four generations of parthenogenesis, a female will have produced almost four times more offspring than a sexually propagating couple.

Thus, the development of sexual reproduction must have somehow offset these advantages; otherwise it would never have been able to prevail.

There are, of course, a whole bunch of fairly plausible theories on this. But those, as I heard from the *Lab Times*' Chief Ed, are the topic of another article in this issue (see pp. 24-9), so I won't hasten to comment on them. Here, I'd rather like to deal with factual topics, for example, that after sexual reproduction had been 'invented', almost every variation you can think of actually became real.

Okay, the case is clear for owls and men: sex includes two sexes. The females produce large germ cells and the much smaller ones produced by the males fertilise them. Let's put aside here the fact that gametes of equal size are rather widespread, especially in less complex organisms. Let's turn directly to the *two sexes*. These, as is known from various zoology courses, don't necessarily have to be neatly split into men and women. Many snails and worms are both at the same time – male and female – and during a sexual act can, therefore, fertilise and be fertilised.

This hermaphroditism occasionally leads to some really bizarre fertilisation rituals. An extreme example is of certain flatworms, which straighten up for pairing, protrude their two "penises" and during the following "penis-fencing" try to pierce the skin of the other. The first to succeed becomes the *de facto* male, delivering its sperm into the other, the *de facto* female.

And this is not the end, by far, of all sexual peculiarities. The papaya tree, for example, comes in three sexes: male, female and hermaphroditic. Barnacle larvae can freely select their sex, depending on the sex of their neighbours to which they finally attach. Or take shrimps, woodlice, oysters, snails, flatworms, fish and amphibians, which, depending on life cycle or environmental influences, can switch their sex from one to the other. Many of them do, in fact, criss-cross their sex several times during their life span – as commonly as we change our feathers during moult.

Among fish, in particular, apparently anything goes. Coral trout, for example, are all born female, with the largest turning to male later in life. Or take the tropical bluehead wrasse (*Thalassoma bifasciatum*). When entering sexual maturity, fish of both sexes look similar. Later, three genders develop: one gender consists of individuals that begin life as a male and remain so for life; another group of individuals starts as females and later changes into males; and then there are females that remain females.

In a goby species, found on Australia's Great Barrier Reef, an even more extreme case of gender-bending has been discovered. All the juveniles mature into females, with some later becoming males. The males, however, can change back into females. In fact, the meaning of male is ambiguous here. The investigators defined a male to be any fish with at least some sperm production. All males, however, also contain early-stage oocytes in their gonads. So, all the males remain part female. The species, therefore, consists of two genders at any one time: all-female fish and part-male-part-female fish (*Behav. Ecol. Sociobiol.* 43: 371-377).

And what about the seven different sexes (mating types) of ciliate *Tetrahymena*? A trivia compared to more than 28,000 recorded for the fungus *Schizophyllum commune*? Probably a world record holder. Ahh, you think in species with many mating types we shouldn't be talking of sexes? Well, at least in terms of compatibility there is no difference.

"Schizophyllum commune has more than 28,000 sexes. A world record holder."

The latest news, however, comes from ants. Lately, I read that within one and the same colony of the harvester ant *Pogonomyrmex*, the queen needs males of a certain type to sire reproductive females; besides this she produces female workers exclusively with males of another type (*Nature* 424: 306-9). (The haploid males hatch from unfertilized eggs). And just yesterday, I found a two-year old paper describing how queens and males of the small fire ant *Wasmannia auropunctata* each reproduce strictly clonally (*Nature* 435: 230-4). Only the female workers emerge from normal sexual reproduction but are sterile themselves. The result is separate female and male lines that, although they combine genes in workers, never *exchange* them. Subsequently, male and female *Wasmannia* go completely separate evolutionary pathways – just as independent species do.

So, are we any closer now to actually defining *sexes*? I'll leave that to you youngsters...

By the way, after all those somehow "un-owly" paragraphs, what sex do you readers think that I am? Male, female,...

Comments: *owl@lab-times.org*