



Photo by M. Minderhoud

the absolute sea level rises. In the contrary case, a temperature drop may result in a lower sea level.

The relative sea level not only depends on the eustatic changes but also on the movement of the earth's crust and the supply of sediment to the seabed. If there is much sediment that remains on the bottom, the seabed rises and the relative sea level falls. If the earth's crust moves downwards, the relative sea level will increase. The sea level can therefore change locally while the absolute sea level remains the same.

Recently, the rising of the sea level has become a very hot topic because of the greenhouse effect and the much discussed climate change. Measurements of the absolute sea level over the last 130 years show a gradual increase of approximately 20cm in total. Scientists predict that the sea level will have risen to 1m by the year 2100 and will continue to rise at the same pace afterwards. This means that certain parts of the world will be flooded. Many human activities take place near the coast on pieces of land that are at or even below sea level.

Low-laying archipelagos like Tuvalu may in the near future disappear below the sea.

But, let's return to the mean sea level. This is the measured level of a calm sea, i.e. one of which all movements, such as wind and tide are filtered out. This is done by taking the average of the results of hourly measurements over a period of 19 years. The measurement of the sea level is done in relation to a landmark. Therefore a change in MSL can be the result of a real change in sea level or a change in the height of the landmark.

That the sea level is not a constant given, is clear from the factors that have an impact on it. Think on things like heavy rainfall and the resulting feed of water by large rivers, differences in density by changes in water temperatures, 'el Niño', the wobble effect and the variation in the rotational speed of the earth, landslides, tsunamis, etc. The difference between MSL and the geoid is around 2m.

Now that we understand and know how to solve the problems of the reference plane, we

can start determining depth. The water depth is partly calculated based on measurement data through the use of sonars, dipsticks and (recently) satellites. The depth depends on the composition of the bottom which muddles the distinction between water and soil. Differences in composition and the interpretation of it results in some incoherencies between the data coming from different sources. In a soft soiled bottom this becomes even more difficult because currents may really stir things up. Fortunately, there are guidelines. At a certain density of the water it counts as the soil, so normally there should be a clear boundary between the two.

We have defined the reference plane and we know where the bottom starts. With the definition of the metre at hand, we can now perfectly and accurately determine the depth. But what is our dive depth?

### DIVE DEPTH

In fact, as divers we are only interested in the local, actual depth at our dive spot. As long as we can approach this properly, we are satisfied. During the dive we wear our depth gauge or dive computer telling us how deep we are. Although expressed in metres, we actually read the pressure surrounding our wrist. This pressure is the result of the weight of the water column above our head. And this pressure depends on the average heights of the waves, the temperature of the layers of water above us, the salinity (the concentration of salt) and the water. Therefore, my depth is not yours (and that is hard to verify).

The next time you hear the question, "how deep are we?", you now understand that the answer is more complex than you originally thought before the start of this article. But such a complicated answer to your buddy's question is most certainly not what he/she expects.



Photo by Torsade de Pointes



Photo by LimoWreck

# YOUTH DIVING – LIFE IN SALT WATER

FEATURE **KIKI VLEESCHOUWERS** AND **PATRICK VAN HOESERLANDE**



Bobtail or Sepioida. Photo by Sven Van Langenhove.



Seaweed Pipefish. Photo by Gerry Beeckmans.

In the last June issue of 'Divers for the Environment', Scrimpy, our nice little shrimp from our book 'Youth Diving for Youth Divers', took you on a tour to his fresh water friends. In this article, Scrimpy will guide you in the salty water of the 'Oosterschelde'. That is a branch from a big river in the Netherlands that gives out to the sea. Exciting!

Because it is in contact with the sea, the waters over there are not as quiet as one would expect in a slow flowing river. There are waves and strong currents. Nonetheless, many animals feel at home in that salty, sometimes violent world. So, eyes wide open and let's go diving!

Scrimpy now wants you to meet his salt water friends and match them up with their descriptions.

### JANOLUS

What is this? Do you see that slow moving creature on top of a small beige coloured 'bush' over there? The 'bush' is a colony of moss animals, the popular food of this beautiful creature. Only a half-finger long, with transparent papillae (a difficult word for the organ that filters air out of the water; a bit like the gills of a fish) that end in blue coloured dots. This is the Janolus!

### SOMETHING SPECIAL

This is a Nudibranch or naked slug, not because it has no clothes on, but because it is a slug that does not drag its house around.

Slugs lay eggs and not just in any way. The eggs are placed in a special design. Each type of nudibranch lays its eggs in a different way. That design tells you which species laid those eggs.

### FACT

Salty waters house many different types of Nudibranchs, more than 50 different types. And they all have a special form or nice bright colours. This is a big difference with slugs you find in the garden; those are just brown or grey coloured and don't look special at all. And these slugs do not nibble on the vegetables in the garden either.

### BOBTAIL OR SEPIOLA

What is this? There is a small creature in the sand the size of a Lego block. It moves with small arms and it constantly changes its colour. This is the Sepioida or Bobtail squid.

### SOMETHING SPECIAL

This cute squid is small and it is afraid to be eaten, so he defends himself very courageously. If the situation is really dangerous, it sprays a small cloud of ink! Or he quickly hides in the sand.

### FACT

There are more squid like animals in our salty waters which are quite nice and much bigger such as the Sepia, or the Cuttlefish. You know its skeleton. It is the flat, oval, white thing we sometimes give to singing birds to nibble on. You can also meet a real Squid, but these are very fast. He usually shoots away before you can even see him, just like an arrow and disappears into the dark.

### MOON JELLY, COMMON JELLYFISH, OR SAUCER JELLY

What is this? There hovers a transparent hemisphere with some strings underneath. In the hemisphere you see 4 circles and the jelly like thing closes and opens again. This is how a Moon Jelly swims.

### SOMETHING SPECIAL

Have a close look at the 4 circles in the hemisphere. Sometimes these circles are coloured violet, that is a female jellyfish. And if the circles are white, you have just found a male one.

### FACT

You may observe the jellyfish very closely. This jellyfish will not sting you. That is, its stings are not toxic to humans and you feel nothing. Beware, this is not the case for all jellyfish. Some may sting you very badly!

### NOW THE DIFFICULT SEARCH IN THE SEA

After the previous article, you have already proven that you know how to find the difficult species in fresh water. Are you as good in the sea? Sure and with Scrimpy as your experienced guide, you'll be surprised who and what you can meet in salty water. There are large animals, but also small and very tiny ones. Eyes wide open, torch in hand, camera ready and brains on maximum alert! Here you go!

### SEA GOOSEBERRY

What is this? An oval sphere, approximately the size of a grape, floating past your mask. There are 2 long strings, tentacles, attached to it. Turn the light of your torch towards it! You see a lot of beautiful colours. You are dealing with the sea gooseberry.

### SOMETHING SPECIAL

A Sea Gooseberry is a Comb Jelly. No, this is not a 'real' jellyfish because Comb Jellies do not have stinging tentacles. Not so long ago biologists thought this was a kind of jellyfish (hence its name), but now we know better. So no pain when a Gooseberry slides along your cheeks with its tentacles. These tentacles have





Janolus. Photo by Ivo Madder.



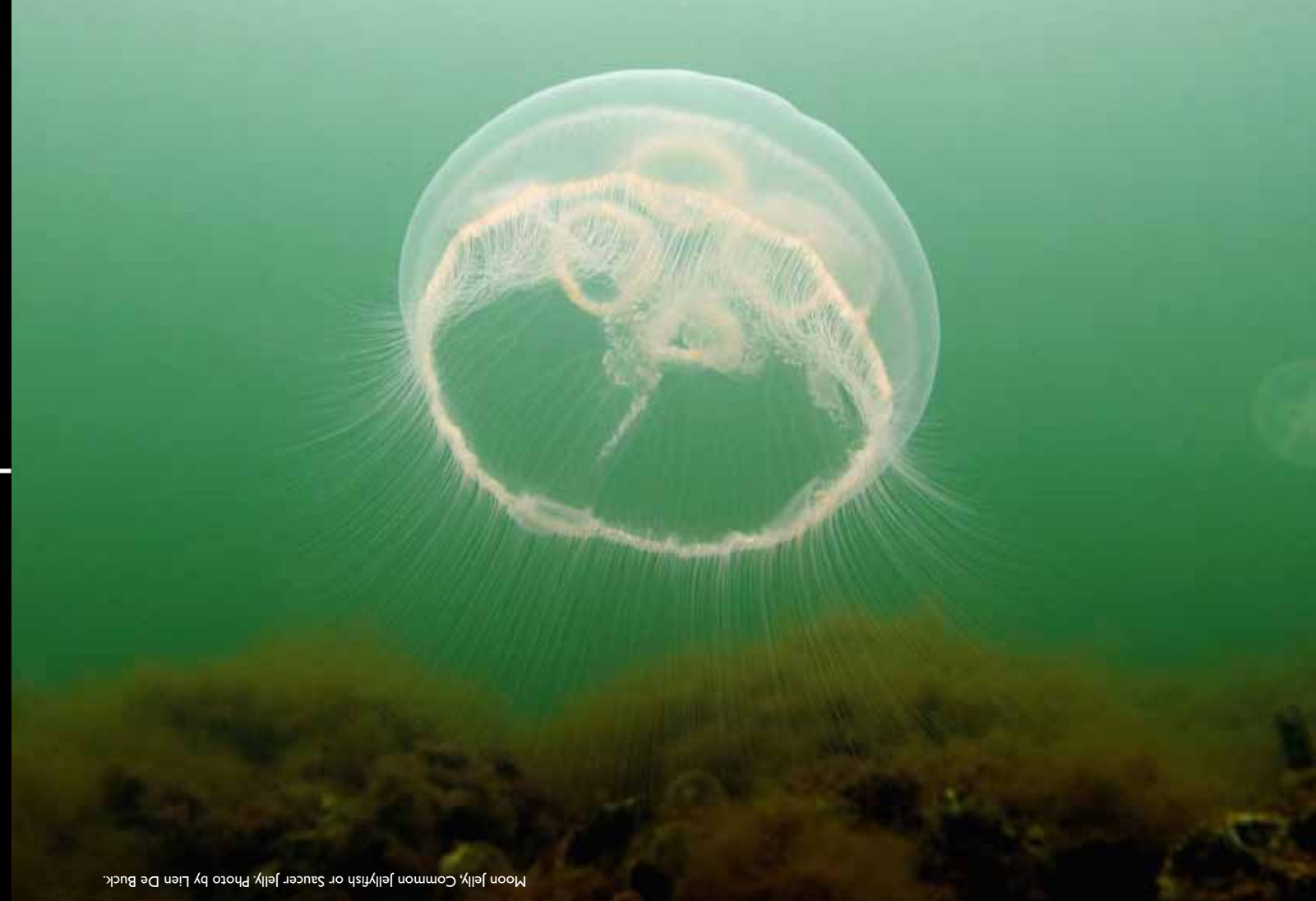
Skeleton Shrimps. Photo by Ivo Madder.



Diadumene Anemone. Photo by Gerry Beekmans.



Sea Gooseberry. Photo by Ronny De Pesserey.



Moon Jelly, Common Jellyfish or Saucer Jelly. Photo by Lien De Buck.

glue cells that catch food such as plankton and it sticks to them. The tentacles transport that food to the mouth of the Gooseberry.

### CIGAR COMB JELLY FACT

The Sea Gooseberry is the favourite food of another Comb Jelly, the Cigar Comb Jelly. Nice, I thought families stuck together; not eat each other. The Lumpfish is also a lover of Sea Gooseberries. This is a very special fish that you can meet especially in the winter months in the salty waters of the Oosterschelde.

### BRISTLE WORM

What is this? A fan-like thing that waves in the current. It has a nice colour of white with brown bands. Feathers? Are there birds living underwater? Get a little closer. Suddenly, the feathered fan withdraws quickly and the only thing you see is a brown chimney like tube. Scrimpy would like to introduce you to the Bristle Worm.

### SOMETHING SPECIAL

The Bristle Worm is a worm that lives in salty water. To protect itself against all those hungry maritime predators, this worm creates his own little cottage that looks like a brownish tube wherein he can completely hide. Only a small part of this tube extends above the bottom and sometimes the worm comes out; these are those feathers. These feathers, or better known as tentacles, capture the food for the worm and help him to breathe.

### FACT

Get your magnifying glass out! Try to approach the worm quietly, so quietly that he does not withdraw his feathers...I mean his tentacles. Very often you see very small and white creatures crawling around those tentacles. Small balls with 2 legs. These are Copepods that love to live together with the worm in close and cosy contact.

### SKELETON SHRIMPS

What is this? On the hard surface there is a white-yellowish, treelike appearance, sometimes up to 50cm in size, but usually smaller. It really looks like a small tree but it is a sort of sponge, called *Halidona oculata*.

### SOMETHING SPECIAL

This is a sponge? Yes, not all sponges have the form of your bath sponge! Sponges are funny animals, you can find them in all sorts of shapes and colours. They are pretty primitive animals. This is another way to say that a sponge has no components. It has no lungs, no stomach and no brain...Sponges are very important animals in the sea because of their way of eating, they filter the water. They not only catch food, but they simultaneously filter all the small debris out of the water!

### FACT

Take a very close look at this *Halidona*. Do you see this unbelievably thin, almost transparent creature no larger than a centimetre hanging? That is a skeleton shrimp. These are very small.

They grasp the sponge with their rear feet so they can use these front legs equipped with miniature scissors to catch food. Really cute! And if you are lucky, you will see his greatest enemy on the sponge, the *Jorunna tomentosa* (what a name)! This beautiful Nudibranch (remember: the slug that does not drag its house around) has the same colour as the sponge and is not larger than 5 centimetres. Can such a little slug be someone's enemy? Yes, because this slug really loves to eat this kind of sponge.

### DIADUMENE ANEMONE

What is this? An Ochre Red 'Flower' of only a few centimetres in size sits firmly on a stone or on wood. Even a shell or the back of a crab would be fine to hold on to. The 'flower' has a solid 'stem' with a halo of tentacles. The *Diadumene* Anemone.

### SOMETHING SPECIAL

This 'flower' is definitively not a real flower, but a Sea Anemone and Sea Anemones are animals and not plants (we already encountered some animals disguised as plants. Do you remember them?). Don't worry if you thought they were plants, they really look like flowers. For this reason, they are also called flower animals and named after the anemone, a terrestrial flower. This little anemone has tentacles that sting. These trap and paralyze the food and bring it to the animal's mouth. But look, sometimes you see that this anemone has a couple of longer tentacles. These are 'fighting tentacles' to keep

other anemones at a safe distance. Therefore, if you find several anemones together, you can see that they keep a nice distance between them.

### FACT

What did we say? That an anemone keeps other anemones at a safe distance with its fighting tentacles? Is an anemone not fixed? No, they can walk. Not at supersonic speed, but they move around!

### SEAWEED PIPEFISH

What is this? Look between the weeds and you will see a long thin yellow-brown 'eel' swimming around. It has a cute little head that looks like one of a sea horse. Please, meet the Seaweed Pipefish.

### SOMETHING SPECIAL

Pipefish are very special fish. They do not have scales or protective plates like a normal fish. And yes, they are part of the Seahorse family. You'll also find Seahorses in our salt waters, but they are not frequently spotted. You have more chances of spotting a Pipefish. For a diver with sharp vision, the snout of the little pipefish is shorter than half the length of its head. The large Seaweed Pipefish has a bump on the rear of its head. Its smaller 'brother', the Little Pipefish does not have this bump.

### FACT

The mother Pipefish is an emancipated female. She gives her eggs to the daddy Pipefish and swims away cheerfully. The daddy Pipefish



Bristle Worm. Photo by Jef Driessen.

takes care of the eggs during five months and holds them in a fold under his tummy. He does this until the eggs hatch and the baby Pipefishes can swim away. What a caring dad!

So, here stops the whirling tour through the sweet and salty waters with Scrimpy as your guide. There are many more plants and animals

to discover, but it is up to you now. Scrimpy invites you to continue discovering every time you dive into the water. And who knows, you may discover something even Scrimpy doesn't know about. If you do, then you must email him and tell him your discovery.

Just let us know: [skubba\\_en\\_fred@nelos.be](mailto:skubba_en_fred@nelos.be)!