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Europe's costal resorts battle a Jellyfish invasion

From Cannes to the Costa del Sol, holidaymakers are under attack. As millions of toxic jellyfish lay siege to the beaches of the Mediterranean, coastal communities are battling to turn the tide. Can they stop the stingers? John Lichfield and Elizabeth Nash report

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Jean-Marie Giorgis, assistant mayor of Cannes, has a view of the Gulf of Fré jus that foreign billionaires would die, or even pay taxes, for. From his office, he can see red rocks, blue sea, green islands, dart-like yachts and glittering cruise ships. Just below his window are the warm stones of a small fishing village that has exploded into one of the world's most elegant coastal resorts.

As he answers a telephone call from an official somewhere out in the bay, Giorgis is not interested in any of these things. Not today. "Are there any jellyfish out there?" he asks. "No sign of them? Thank heaven for that."

Giorgis is in charge of Cannes' most treasured assets: its beaches and its waterfront. For the time being, that makes him the town's "Monsieur Méduse" or "Mr Jellyfish".

Like dozens of other resorts along the north Mediterranean coast, Cannes is under siege from a monstrous-looking primeval creature from the depths. For reasons still little understood, this summer the coast is facing a plague of an especially poisonous and painful species of stinging jellyfish, the " mauve stinger", or Pelagia noctiluca. Luminous at night, it is armed with a ferocious sting that can swiftly paralyse humans.

Follow the coast further west from Cannes and the mauve stinger invasion is in full spate, threatening Spanish holiday beaches from the Costa del Sol to the Costa Brava. The Spanish environment ministry has adopted new measures to combat the annual onslaught, which has been worsening steadily for two decades.

To the east, Italy's beach resorts are braced for the worst. A task force of the government's Agency for the Protection of the Environment is monitoring jellyfish movements, ready to warn bathers to stay out of the water. Last year, many of Italy's most popular coastal stretches were attacked, but so far this season they have been spared. Experts are divided as to the reason. Some put it down to unusual wind and tidal conditions; others claim the creatures' life cycle is at a low point. The jellyfish, in other words, are lying in wait. No one doubts they will be back.

Sixty million jellyfish swept up on Spanish beaches in 2006, and more than 70,000 holidaymakers were treated for painfully swollen limbs and allergic reactions – 300 in one day in Benalmadena, near Malaga. The year before, four glaucous tons of stranded jellyfish were carted from the luxury coastal resort of Marbella. The environment ministry has mobilised hundreds of volunteers, skippers of pleasure craft, divers and fishermen the length of the southern coastline in an early warning system to alert for poisonous swarms before they approach the beach.

Joachim Such, manager of the Nautical Club of Altea, near Benidorm, is among those who have signed up. "They've asked me to recruit experienced people who go to sea regularly throughout the summer. When they spot a bank of jellyfish, there's a freephone number to call and a special procedure to report sightings," Such says. Once forewarned, local authorities onshore are then meant to prepare for the imminent invasion by mobilising Red Cross medical attendants, alerting bathers or closing off the beach entirely.

In the regions of greatest risk, including the coast off Malaga, the ministry has leased boats to scoop up the glutinous creatures before currents and winds sweep them ashore. Nets have been used to trap swarms spotted at sea, although that measure was found to be counterproductive: the jellyfish would just release their tentacles, which floated inshore semi-decomposed but with their stings still intact.

One of the films in competition at the Cannes Film Festival in May was an Israeli movie called Les Méduses ("Jellyfish"). Local people wondered

whether it was a joke against them, a spoof remake of Spielberg's Jaws. The film actually used the jellyfish – beautiful, near-invisible but toxic – as a metaphor for the hidden complexities of the human soul.

Jellyfish may have points of comparison, but they are nowhere near as nasty as sharks. Nevertheless, their stings can be very painful: "like touching a hot stove", according to one victim. Jellyfish stings can lead to unpleasant rashes or respiratory problems among the elderly or physically infirm. They are almost never fatal. All the same, many visitors to the Côte d'Azur are wondering whether it is – in the words of the Jaws poster – "safe to go back into the water".

Infestations of jellyfish come and go with the winds and currents. The beaches can be clear for days at a time then suddenly turn into a kind of jellyfish soup. This uncertainty – and the difficulty of seeing the creatures – has made taking a dip in the Mediterranean somewhat less relaxing than it once was. Last year, beaches were closed for brief periods from the Costa del Sol to Sicily via the Côte d'Azur and Corsica.

Two weeks ago, one fairly early assault engulfed beaches at Xabia, north of Benidorm. Seventy bathers were stung before the beach was closed; usually the jellyfish don't come to Xabia till August. And last week 19 beaches in Catalonia, including five off Barcelona, flew the yellow flag indicating danger from jellyfish.

There is no sign of tourists staying away from the Mediterranean en masse yet. The terrible weather further north has blown and washed even more visitors towards the South of France and Spain this summer. But local hoteliers, restaurateurs and politicians are worried nonetheless.

"Not all tourists want to swim or bathe. Some never even go on the beach," says Lucas, the manager of a fish restaurant near the Cannes waterfront. "But Cannes is not all about millionaires and starlets. Some of us depend on family tourists with children. To them, the beach is what a holiday by the sea is all about. They detest the idea that thousands of jellyfish are waiting to pour into the bay, sting their kids and ruin their holidays."

This week, Cannes took the lead in anti-jellyfish defence on the Mediterranean coast. A sophisticated diamond-shaped floating boom, attached to a fine, 2m-deep net, was deployed around three of the public beaches on the 10-mile waterfront.

"This is an experiment," says Giorgis, the assistant mayor. " Until we try it, we have no idea whether it will work as we hope. There is no way of knowing how the barriers will react to storms, for instance, or whether small pieces of dead jellyfish, with the stinging filaments still attached, might penetrate the netting.

"We are hopeful that this will provide at least a partial solution. If it works, it will at least provide areas which are safe for children, even when the jellyfish arrive in great quantities in the bay. If so, we will consider expanding the defences considerably next year."

The Cannes experiment will be widely watched along the Mediterranean coast. Similar small barriers have been erected elsewhere, but nothing has been attempted on this scale.

The problem, Giorgis explains, is how to fit jellyfish defences into all the other activities beloved of the energetic rich who flock to the Côte d'Azur. The rade or bay of Cannes is used by waterskiers, jet-skis, yachts, launches and cruise ships. Placing a big, fragile net across the bay to keep the jellyfish out is not an option. Not yet, in any case.

Spanish authorities have also enlisted help from the jellyfish's main predator since ancient times, the leatherback turtle (Caretta caretta). Spaniards call it the tortuga boba – stupid turtle – because of its clumsiness in catching fish, a deficiency the creature overcomes by preying on jellyfish instead. But the leatherback's beach-side habitat, where it lays its eggs, has been ravaged by tourism, and the animal is under the looming threat of extinction.

Authorities have planted some 800 turtle eggs along the coast, in the hope that they will hatch and eat the translucent invaders before they harm holidaymakers. Some 60 live turtles have also been released around the Cabo de Gata in Almeria. But the operation is only a panacea, acknowledges the local marine biologist, Juan Jesus Martin. "The protection and recuperation of the species is needed to restore the balance of the ecosystem," he says.

But why have the jellyfish suddenly become so abundant in the Mediterranean?

There are more than 10,000 species of jellyfish. They are not, to be a ccurate, fish at all, but a kind of giant plankton, which cannot swim but float on currents and the tide. Curiously, the same orifice in the jellyfish acts as both mouth and anus, which makes them – apart from their lack of backbone - a useful source of insulting political analogies.

Some scientists and ecological campaigners explain the new prevalence by pointing to a rise in average sea temperature, linked to the warming of the planet. Lack of rain has meant a shortage of cold fresh water entering the sea from rivers, with the end result of a warmer, saltier sea that puts off larger creatures but is well-suited to jellyfish. Human sewage, together with fertilisers from intensive farming along the Mediterranean coast, produces a rich soup of nitrogen and phosphates that jellyfish also like.

Others blame the fact that natural jellyfish predators – such as the bluefin tuna and the turtle – have been driven almost to extinction, a consequence of overfishing and pollution. Still others think that the jellyfish explosion might be connected to the overfishing of other species, such as the anchovy and the sardine, which used to compete for the minute creatures and plankton on which jellyfish voraciously feed.

There also seems to be a connection with a change in the wind and the pattern of the Mediterranean currents, which may themselves be linked

to global warming. Jellyfish live deep in the sea during the day but rise to the surface at night to feed. For all their undulating mobility, jellyfish have little control over where they travel, and are mostly swept along by currents and prevailing winds that propel the creatures landwards.

It all signals a deep malaise in the Mediterranean. "Every jellyfish that comes ashore brings us the message that the sea is sick," says Josep Maria Gigli, scientific coordinator of the Spanish environment ministry's Medusa Plan.

Apart from the mauve stinger, various other species also thrive in the Mediterranean. One regular visitor is Cortylorhiza tuberculata, known as " fried egg", which luxuriates in the warm, salty lagoons near the fashionable Murcian resort of La Manga, lagoons rich in nutrients from the fertilisers drained from the region's intensive plastic-greenhouse agriculture. The fried egg's sting is mild, but its sheer numbers transform the water into a milky gloop. Rhizostoma pulpo, or octopus jellyfish, named for its eight long tentacles, is also on the increase.

The deadly Portuguese Man o' War (Physalia physalis) is increasingly being swept towards Europe's Atlantic coasts, in "blooms" resembling a sinister sea of plastic bags. But so far, currents have yet to drag this majestic but deadly creature through the Gibraltar Strait into the Mediterranean.

"Jellyfish are a natural part of the marine environment, but the scale of what's happening now is a warning that something's going very wrong," says Dr David Santilo, a marine biologist for the Greenpeace research laboratories at Exeter University.

The French-Canadian biologist Daniel Pauly paints an apocalyptic vision of oceans taken over by jellyfish: "We are moving from a marine ecosystem dominated by big fish to a soup of small organisms. If we carry on like this the only things in the sea will be jellyfish and plankton soup."

A return to primeval slime? "A lot of pressures are pushing in that direction," says Dr Santilo. "The mechanisms are there to make that happen. Ecosystems are flexible up to a point, but no one knows when elasticity breaks into a different sort of ecosystem and you get an irreversible shift. This plague of jellyfish is a like hazard warning light. It's a wake-up call."

Ecologists do not criticise the Spanish government's effort to protect holidaymakers from unwelcome tentacular visitors. But they say it is not enough. "It's like using a fly swat to combat malaria," says Ricardo Aguilar, a spokesman for the international environmental organisation Oceana. "The sickness remains."

Gabriel Gorsky is a marine biologist at the Observatoire Océanographique in the town of Villefranche-sur-Mer, between Nice and Monaco. He believes the problem is that jellyfish have never been studied in great scientific depth. They have lived on the planet for 650 million years but have never attracted much attention from mankind.

"It is only now that they are causing a problem that we have started taking an interest in them," he says. "But even now, the money available for research is limited. The truth is that we really don't know why they have started to appear in much greater numbers. It could be global warming. It could be a lack of predators and competitors. It could be a change in winds and currents. It could be a combination of all those things. But we really don't know yet."

The truth is that there have always been jellyfish in the Mediterranean. Traditionally, they have appeared along the Côte d'Azur every 10 or 12 years and remained for about four years. Then they have retreated to the depths again.

In the last decade, however, the pattern seems to have changed. In the period from 1996 to 1998 there was a much larger infestation than any seen before. The shoals of jellyfish then disappeared, but returned once more, earlier than expected, and in still greater numbers, in about 2003.

Their numbers were worryingly large last year. There was something close to a panic when

the bays and coves were suddenly filled with near-invisible stinging creatures the size of soup plates. This summer, they have been elusive, teeming along some parts of the French Mediterranean coast, absent in others.

Cannes has been relatively spared. A fortnight ago, however, there was a sudden eruption of jellyfish in the waters of the Plage Macé close to the celebrated Palais des Festivals where the Cannes Film Festival is held each May. In a matter of minutes some 60 people were treated for stings. (The best treatment, by the way, is to rub the sting with salt water, never fresh water. Try to scrape out the poisonous filaments or tentacles with a credit card or the back of a knife, then spray with cortisone.) Plage Macé is one of three places to be protected by nets starting this week. Gorsky, the marine biologist, was asked to advise on the Cannes jellyfish defences and urged the town to go ahead. "Everything is worth trying," he said, "but any form of net is likely to be only partially effective. Jellyfish only live for a few months. When they die, they break up into small fragments. If the stinging filaments are still attached, even a small blob of jellyfish can give you a nasty sting."

Walking along the beachfront in Cannes, there is no obvious sign of jellyfish panic. The sunbathers are packed in rows like sardines on a grill. Adults and children play happily in the water. The only objects remotely resembling jellyfish are the breasts and bellies of the more ill-advised topless bathers, male and female alike.

Most tourists, in fact, say they had no idea that there was a jellyfish problem. Denise, 43, from Paris, did say that she had considered going to Brittany to "escape the jellyfish" but decided to come to Cannes to "escape the rain" instead.

Audrey Jannin, 19, a student from a village between Cannes and Nice, says local people tend to take jellyfish philosophically. It is the tourists who are more scared.

"The trick is only to bathe in the morning when the water is clear and has not been stirred up by other people," she advises. "You can usually spot the pale purple of a jellyfish then and keep away from it.

"I was stung once when I was smaller. It was like leaving your arm on a hot stove for a couple of seconds. It was much worse than a wasp sting. But it soon went away."

Jean-Marie "Mr Jellyfish" Giorgis, meanwhile, is ready. He says the Cannes jellyfish defences have been carefully planned, based on advice from marine biologists. The nets, he explains, will be arranged in a diamond formation, protruding from the beaches. Square or round defences would simply catch the jellyfish, parts of which might then break through the nets. The diamond shape, however, is expected to guide the jellyfish on to the surrounding beaches, where they will be scooped up and dumped far out to sea. There will be a fully staffed first aid and lifeguard station placed beside each jellyfish-free zone, just in case.

"We can't be sure it will work, but it is an important experiment," reiterates Giorgis. "We hope to create safe areas where children should have no fear of being stung. People come to Cannes to relax, not to worry about what is in the water."

Gorsky, too, stresses the element of the unknown. "This year and next year will be an important test," he says. "On the basis of their old behaviour pattern, the jellyfish should begin to disappear. If they don't, we will know that something has radically changed in the ecosystem of the Mediterranean."

Barbed and dangerous *By Steve Connor*

Jellyfish are not in fact fish, but a class of marine invertebrates called the Scyphozoans. They start out in life as simple polyps attached to rocks but then develop into floating medusa, with a radially-symmetrical , umbrella-shaped body called a bell. Jellyfish have a simple body plan and are just one step removed from colonies of individual animals clumped together. They possess tentacles armed with batteries of stinging cells or nematocytes. Each of these cells has a stinging apparatus known as the nematocyst, which is essentially a sac of poison attached to a sharp, hollow tube armed with barbs.

The stinging cell works like a jack-in-the-box, springing out when brushed by a passing arm or leg. Being stung by just one nematocyte would not be felt, but having thousands injecting their toxin into your skin can be painful, and even dangerous if they come from certain warm-water species, such as the box jellyfish or the Portuguese man-of-war – which is not a true jellyfish but a floating colony of single-celled creatures called hydrozoans.

There are about 10,000 species of jellyfish in the world and more than 100 are known to be toxic to humans. Some jellyfish commonly found in British waters are harmless or have a very mild sting, but others can be painful and even produce a toxic, immune shock. The Marine Conservation Society recommends that people should not touch jellyfish they might find washed up on the beach or floating in the sea.

If you are stung, a simple remedy is to wash the area with salt water or vinegar, but try not to rub the skin too much as this will just spread the poison. It is also recommended to remove any stings or tentacles attached to the skin to prevent the further release of toxin.

Some of the stinging jellyfish to avoid include:

* Lion's mane jellyfish (Cyanea capillata). Grows to 50cm but can reach 2m in diameter. Large, reddish brown, umbrella-shaped bell with a mass of long, thin, hair-like tentacles, in addition to four short, thick-frilled and folded arms.

* Mauve stinger (Pelagia noctiluca). Can reach up to 10cm in diameter and has a deep bell with pink or mauve warts. Has 16 marginal lobes, eight marginal, hair-like tentacles and four longer, frilled arms with tiny pink spots.

* Compass jellyfish (Chrysaora hysoscella). Can grow up to 30cm in diameter. Usually has a pale umbrella-shaped bell with brownish, V-shaped markings. It has 32 marginal lobes and 24 long, thin tentacles. Four long, thick-frilled arms hang from the underside's centre.

* Moon jellyfish (Aurelia aurita). This transparent jellyfish with an umbrella-shaped bell edged with short, hair-like tentacles can grow up to 40cm. Its sting is mild and the most distinguishing feature is its four purple rings in the centre of its bell – its reproductive organs.

* Blue jellyfish (Cyanea lamarckii). Similar in shape to C. capillata but is smaller with a blue bell through which radial lines can be seen. It has a mild sting.

* By-the-wind-sailor (Velella velella). Not a true jellyfish but a floating colony of individual creatures known as a hydranth. Can grow up to 10cm long and is blue-purple. Can occur in vast swarms.

*Portuguese Man-of-War (Physalia physalis). Again, not a true jellyfish but a floating colony of microscopic hydrozoans. Its distinguishing feature is the oval-shaped, transparent float complete with crest, below which hang many "fishing polyps" that can be tens of metres long. The powerful stings are extremely dangerous. They are fortunately rare in British waters, but not unheard of.