



## A BOTANIST IN THE SAHARA

Some pages from the travel diary of FRITS W. WENT

*Last summer I signed up for an excursion to Algeria, to be held before the International Botanical Congress in Paris. One of the main reasons I took this trip was to visit the Sahara, if only for a few days, to compare it with the other deserts I had seen.*

### **Algiers, June 14**

The excursion is not going into the desert as originally planned, because it is already too late in the season and blazing hot. But since that is what I came for, I

arranged to go only for the first week with the excursion and then take the train to Beni Ounif on the edge of the Sahara near the Moroccan plateau, and stay there five days. Everywhere it seems to be politically quiet and safe, and I was warned only against scorpions and snakes.

This afternoon I took a long walk through Algiers. I was told that the Casbah was safe to walk in during the day, and this proved to be the case.

Along the Rue de La Casbah there were open air restaurants, with the tables and chairs leaving just enough

space for the donkeys and pedestrians. Not a car penetrates this Arab quarter, and I did not see a single non-Arab. I hope to see it in sunlight, too; I couldn't take any pictures today in the gloomy, overcast light.

It probably seemed more gloomy than it really is, for the number of blind and deformed people is appalling, and almost every other disease, even leprosy, is common. Nor have I ever seen a more complete collection of whiskers of all sizes and descriptions.

The women still go largely veiled, though the nose and mouth seem to be the only parts of the face which should be hidden now—behind almost transparent nylon handkerchiefs.

The stench was terrible—as bad as in Jaffa—largely rotting urine, but also rancid fat from frying, mixed with spices. Streets either go up and down as stairways, or are almost level. Whereas there seems to be a minimal street width at walking level, every house tries to steal as much space above the street as possible. The second floors jut out into the street so that, higher up, the houses are less than a yard apart, and sometimes are even built together.

The living quarters were worse than anything I saw elsewhere, even the smallest holes had mattresses with people lying on them. Whereas all the houses in the Casbah were many stories high, just outside it there were packing-crate hovels, covered with corrugated iron, which would have made the Okies of the thirties blush. They were piled three deep along some of the streets, and served as living quarters and stores at the same time. Instead of doors they would have a curtain of blouses or garments which were being sold.



NOVEMBER, 1954

### Boghari, June 15

This morning the excursion started exactly on time, with 15 of the 17 excursionists present. A big bus was waiting for us in front of the botany building of the university.

We first drove through the rich quarters of Algiers, with enormous villas surrounded by gardens. Here there were bougainvillea, jacaranda, and other trees flowering, but on the whole not much is done for the beautification of the city with trees.

All country we crossed today was calcareous, and in many places it made me think of Israel or southern Spain, and later also somewhat of southern California. We first crossed the hills of Sahel, immediately behind Algiers, with no natural vegetation left, and then came into the Mitidja Valley, which was—before the arrival of the French 125 years ago—a big swamp. Now it is drained and very fertile and looks like the Esdraelon Valley in Galilee.

After passing through Blida, we arrived at the Atlas de Blida, which is hardly 2000m. high, but which we crossed through a deep, impressive canyon. Along the stream lots of wild oleanders made a pink ribbon, and on the slopes wild figs and wild olives grew. We stopped at a small side canyon, the Ruisseau des Singes, where there is still a whole colony of wild monkeys.

Emerging from the canyon we came onto a landscape of rolling hills with a lot of erosion, planted largely to grapes. At the price of wine (20-25c a bottle) they must grow grapes for pleasure rather than profit.

### In the Ouarsensis, June 16

After a short night in a rather primitive hotel in Boghari we left at five this morning. The country was much drier, and completely deforested with even no macchi (chapparal) left and very poor cereals cultivated by the Arabs.

Late in the morning we arrived at Teniet-el-Haad, where a National Park has been created to protect one of the few stands of *Cedrus atlantica* (Mediterranean cedar) left in Algeria. Although deforestation can account for a part of the paucity of *Cedrus* stands, even before man came they must have been very scattered too, like *Sequoia*. Many of the trees which are left are magnificent, perhaps 500 years old; the oldest tree counted had 800 rings. The largest I saw had a circumference of 71½m. It is remarkable how successful Conifers really are as trees, at least in cool climates. This is perhaps another example indicating that there is no such thing as evolutionary pressure and that once an organism is adapted it cannot become "better" adapted than other organisms living under the same conditions. That is to say, adap-

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tion is to the physical environment, and not in relation to the other existing plants.

**June 18**

We are now on the road from Saida southward to drier regions. If we could follow it for 2,000 miles we would arrive in Tombouctou. The country is a high plateau, gently rolling, treeless, and largely planted with barley—hundreds of acres at a stretch. Some of it looks excellent, some beautiful—all red with poppies. Everywhere you see Berbers' tents, which look just as decrepit as the Bedouin tents in Israel. There are usually some donkeys around, and in a few places the camels are close to the tents.

The donkeys are the main means of transport, and the methods for riding them are numerous. One either sits astride, in the middle or further back, closer over the props if the donkey is small or the rider large. One can also sit sideways, with both legs on one side—but in either position one kicks the belly of the donkey once per second with both heels. The more important Arabs ride horses, and have saddles with backrests.

As for other animals—there are no mosquitoes, few flies, lots of really vicious Arab dogs, many scorpions (they said one under every two stones, but we found only one under every *four* overturned), some snakes—among which adders are the most poisonous—many singing birds near water, and lots of storks with nests on roofs, chimneys, dead trees or even palms. On the flower heads of thistles there are lots of butterflies and brilliantly colored beetles. There were Scarab beetles rolling manure balls. But I did not see—or feel—bedbugs, fleas, or cockroaches.

**June 19**

After leaving Saida we drove all day through more or less mountainous country. There was very little forest left, and the undergrowth became opener. This made the development of annuals good, and more and more appeared. I had a good day collecting seeds.

At noon we stopped at Sidi bel Abbes, headquarters of the Foreign Legion, and saw their museum, which is not particularly inspiring. We stopped for the night in Tlemcen, which lies at about 800m. altitude and is nice and cool, even in summer, so that many people come here to escape the humidity of Oran or the coast in general.

In the the town there are three mosques and an old Arab fortress, now of course held by the French. Outside the town there are rather remarkable ruins of the walls and towers of a second city, built there by the Sultan of Morocco, who once laid siege to the Sultan in Tlemcen. When this siege stretched over many years, the Sultan of Morocco built a separate city for his army just outside the city of Tlemcen, and the ramparts and the Tour du Juif still exist.

This morning we walked to a canyon just outside Tlemcen, where a river comes down from the rather high mesa-like mountain, making fine waterfalls. It was perfect Sunday-morning weather, sunny with just enough wind to make it cool.

We passed Arab houses and saw a lot of washing being done in an irrigation ditch, which followed the contour lines of the rather steep mountain.

While washing, most women do not have to be veiled; fortunately, for in inland Algeria all Arab women look like nightmares, with a white sheet wrapped around them, from which only a single eye peeks out. Why there are not more traffic accidents I do not understand, for these women cannot possibly judge distance.

In a pine forest planted against the higher slopes of the mountain dozens of families were camping. These were largely Arabs—quite emancipated, for the women were not veiled and the younger boys and girls were doing some sort of folk dances.

**En route to Beni Ounif, June 22**

Before going on with our daily progress, a few observations on smog. Everywhere over Algeria hangs a more or less dense blue haze. In the mornings a whitish haze forms near the surface of the soil in the valleys, which rises as a bluish haze and soon decreases visibility of the surrounding mountains. The previous day's smog seems to lie as a definite layer at perhaps 1000m. height.

Near Oran the smog is denser, and clear pictures of the city from a distance seem to be impossible at this time of the year. I was told that this haziness is most pronounced in May and decreases in August, when the vegetation becomes very dry.

**Beni Ounif, June 24**

Today we had an exciting day. At 6 a.m. we left Beni Ounif on foot, taking with us food and water for the day. We walked the 8 km. to Figuig, one of the largest oases in existence, on Moroccan territory. We first crossed a very flat and almost vegetationless plain, with here and there in the lower places a green shrub of *Zyziphus Lotus*. When we came to the mountains we found a bright green shrub I had already seen from a distance, which proved to be *Capparis spinosa*, perhaps the most amazing plant I know. It was anchored in the crack of a rock, with no apparent roots reaching the soil below. This would not have done it much good anyway, since there were practically no other plants growing in the neighborhood, and so there must have been very little water around. Yet the plant had lush green leaves and beautiful white flowers.

Later we saw about a dozen other plants growing in rocks, some of them having obviously split the rock. This plant must be able to grow without any water from its substrate, and must develop enormous suction forces. But why, if the plant is so obviously adapted to extreme desert conditions, does it not grow all over these mountains? It is not grazed off either—partly because it

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grows in very inaccessible places, and partly because of the extreme bitterness of the leaves.

At the pass between two mountains we came upon the road to Figuig, and the overflow of the oasis water passed through there and supplied a fair number of date palms, surrounded by little gardens. In the distance Figuig lay on a high mesa, one mass of date palms, with a few mosque towers sticking out.

The whole town of Figuig, with 10,000 inhabitants, is surrounded by walls, and each individual date garden is also walled with stone or adobe walls, 2-3m. high. Each family owns such a walled garden, and other crops are grown in between. The wheat had just been harvested, and in some places vegetables were planted, although most gardens were left dry over the summer, when there is not enough water to irrigate the whole surface of the oasis.

We went first to see the captain of the garrison. He gave us a guide, who showed us the whole oasis, which is a composite of about seven villages. At the head of it is a Pasha, who rules as a mayor with Shirs, a sort of councilmen, one elected by each village. Each village also has its Cadi, a Justice of the Peace. On our walk a very dignified Arab came up to us, ceremoniously gave us a hand, said a few polite things, and went on his way. He was a Cadi.

We first went to the springs, where all the water for the oasis comes from. They are very large, and must be artesian, for they are located at the highest point on the mesa. They are probably cemented-over, and we heard a lot of noise from small boys emerging from one of the springs. Our guide chased them out of the spring, where they had been swimming. From the endless number of naked copper-brown boys emerging from the staircase I imagined that the spring was larger than it actually was. Inside it was suffocatingly hot and humid. Another spring was beautifully clear and blue. From these springs, about 5m. below the surface of the village, an amazing network of underground ducts distributes the water through the oasis; everywhere there are manholes through which these ducts can be reached.

Then we walked through the living quarters of one of the villages, with a maze of little streets just wide enough for a donkey with his burden. In some places the streets were completely covered with houses and formed cool places where men congregated. The sanitary system seemed very good, for the whole village smelled sweet. We saw dozens of apparently public privies just off the street. In the older parts of the villages there are watchtowers, still left from the time when villages fought bitterly among themselves.

Finally we saw the Public Garden, with a slight attempt at a formal garden and a nice public swimming pool. After having eaten our lunch near one of the springs, to the accompaniment of the joyous cries arising

from any swimming pool frequented by boys, we tried to find our way back. We did not want to take the same road we had come on, and soon found that the village was one of the most cleverly designed mazes we had ever seen. We knew in which direction we had to go, but innumerable times crossed our path, trying to emerge from the endless walls which always again loomed up around us. It took us exactly one hour to get out again. At 2 p.m. we reached Beni Ounif again, more dehydrated than any of us had ever been before. We stood under the shower with a bottle to drink from, trying to let water re-enter our system from all directions.

At 4:30 the military doctor came to get us. He had to make a visit to an outlying village, Fendi, and went there with his Arab assistant in a jeep. The road was fair—just a scraped surface, going through an endless desert plain, with low mountains to the NW. Here and there a smaller or larger group of palms indicated water, and in each of the larger clumps there was a well for watering sheep and camels, which were grazing all around on the sparse vegetation. It had been a very wet winter, and lots of dried-up annuals covered the ground. But there were very few perennial plants to be seen.

### Beni Ounif, June 25

Fendi itself was a very small village of perhaps 100 inhabitants. It is of course, an oasis covered with date palms, which looked good. We were very ceremoniously received by the village notables, the doctor being an important official. A big colorful carpet was rolled out under the palms, very nice pillows, all home-made, were placed on it, and the doctor presided over the assembly in a friendly but dignified manner. He spoke some Arab, but most of what he said was officially translated. I spoke some with the Arabs, who had a slight knowledge of French.

When they asked where I came from, they knew the United States, but California or Los Angeles did not register. Then I thought I had a bright idea, and told them I was from Hollywood, but that drew a similar blank. I realized later that these people have never seen or heard of movies.

As I was invited to sit down on the carpet, I realized just in time that one takes off his shoes in Arab countries as one is invited in. Then the tea ritual started. The president of the village ordered his underlings to bring everything. A water kettle with a 5mm. thick layer of soot was placed on a fire nearby, and then a big brass tray with a silver teapot and five glasses and a lot of other paraphernalia was placed in the center of the carpet. Out of a teacan of the old-fashioned type I remembered from Holland about a half cup of tea was poured into the teapot, which was first rinsed with water, and this wash water was thrown away. Then the pot was three-quarters filled with water, and little packages of mint were stuffed into the pot. Then a big sugar-loaf was produced and a brass hammer, looking like a geological hammer.

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The sugar-loaf was skillfully reduced to large pieces which could be stuffed into the pot. After a proper waiting period the brew was officially tasted, and poured from great height into the glasses. It was very sweet, but delightfully refreshing. Then the spent mint was removed from the pot, some more tea added, new mint, water and sugar, and then a second cup was poured.

As a guest you have to drink three glasses like this in succession, but I stopped at two. And I did not have any bad effects from it. The tea, however, was green tea.

In the village I made a list of the plants which they cultivated. In the middle of the oasis they had a dam which kept a small lake as a water source. The level, however, was low, and consequently they did not have enough water for irrigation in some places and their cultures had started to wilt. The water is all pulled up in very primitive buckets made of old automobile inner tubes fastened to a lever with a counter-weight.

One of the interesting things about their cultures is the complete absence of our common garden pests and diseases: no aphids or viruses. Tomato plants looked excellent; they were just starting to get into production. All is used for local consumption; not only are there no local markets, but transport over long distances over the desert would be impossible.

Of fruit trees, in addition to dates, there were fig, peach, apricot, lemon, grape, and pomegranate (only the latter in abundance). Vegetables grown were tomato, cabbage, eggplant, squash or pumpkin, onion, broad bean, watermelon, pepper (paprika), perhaps a little corn.

### Beni Ounif, June 26

The first day we arrived I was surprised at the low intensity of the sunlight here. At 0900 or 1000 you could look almost directly into the sun, which had a whitish haze around it. Everyone had told me that the radiation of the sun was so strong here that you *had* to wear a hat or something. This proved to be nonsense, and in Dr. Maire's publication *Études sur la Flore et la Végétation du Sahara Central*, I find that he says that in the Sahara the photochemical light intensity is much weaker than one would think at first, because of the frequency of dust in the air. Dust content of the air is so great that sometimes "dry fogs" occur (veritables brumes seches). But because of the low vapor content of the air, the heat radiation is high, and this causes high temperatures.

Wind is very common in the Sahara. This causes a curious surface-pitting of stones, which we hardly have in California deserts. The typical desert sheen I have not seen here. Since we came here there has been much wind, which comes up very suddenly, and then as suddenly stops. This is largely a question of local heating, for the barometer did not change abruptly during these

wind-storms, and during night and early morning the air was very quiet. The enormous expanses of flat terrain without intervening high mountain ranges certainly must help in building up strong winds. I wonder whether it is this wind that keeps vegetation here so poor.

### En route to Algiers, June 27

The excursion has been so concentrated thus far that there has not been time to consider in a more detached way what I have seen thus far in Algeria. I cannot say that I feel at home here, although many aspects of the country remind me of other Mediterranean countries or of California. I do not know whether that is because there are hardly any forests where one might find refuge, or no higher mountains where unspoiled vegetation beckons the biologist, or whether it is the humidity of the coast zones, the dirtiness of the Arabs or the cyclopic women—looking like Ku Klux Klanners—or the monotony of the landscape without trees.

The wheat fields are enormous but it seems that they produce just enough for local consumption. The Arab wheat fields are poor, with lots of weeds, and are on odd lots around their villages. They are harvested by hand, but the big European cultures are just now being harvested by big combines. Nowhere is the monotony of these wheat fields broken by a farm surrounded by old trees.

Vineyards look much nicer, with their soft green; they are more closely planted than in California, probably because there is more rain. There are also large olive orchards, but these are still relatively young and look like our San Joaquin Valley fruit orchards—that is to say, too neat—and they have not taken on the patina of old age, so attractive in the other Mediterranean countries.

Really full of charm was Figuig; that is a place I will always long to see again. It was a real oasis, a restful shady place in the harshness of the desert. It is to some extent comparable to Palm Springs, but for the rest, there is nothing in California comparable to it.

After returning to Pasadena I looked up what had been written by other botanists about the Sahara. I found that visitors who had only seen the Sahara had a somewhat warped idea of deserts in general. In the clear deserts of California or Israel plant growth is relatively more abundant than in the Sahara, when places with equal rainfall are compared. This means that rainfall is relatively more efficient in deserts with less wind and less dust.

It is very likely that dew is of importance in this better development. According to observations of Foureau and Fitting practically no dew occurs in the Sahara, which is understandable, because its dust would prevent radiation toward the sky. In our deserts and in Israel, dew is a common phenomenon and the differences in vegetation noted above are apparently related to this dew difference.