Ilia Deleff

PHENOMENAL CRYSTALS

- GIANT QUARTZ CRYSTALS
- UNIQUE MINERALS IN WORLD MUSEUMS
- GEM TREASURES OF BRAZIL

PENSOFT

Ilia Deleff

PHENOMENAL CRYSTALS

"Ilia Deleff – collector and protector of phenomenal crystals of minerals"

Photos by Ilia Deleff and Erik Gonthier

Literary Editor & Co-author of Chapters 1 & 2 *Lilia Petkova*
Scientific Editor and Co-author of Chapter 3 *Ruslan I. Kostov*
Translation *Krasimir Kabakčiev*

On the front cover –
reproduction of the picture
"Preserving the mineral richness of the Earth",
by the artist Wojtek Siudmak

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Phenomenal Crystals

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INTRODUCTION

Ilia Deleff headed for South America at the age of twenty five with a clear aim "to do something in my life". Fascinated by the beauty of quartz crystals in Brazil, he started to collect them enthusiastically and, as far as we can judge, he is the only collector of giant crystals in the world.

Conquered by their secret power and the perfection of their forms, he penetrated the intimate world of crystals and marvelled at the magnificent play of light reflected on their smooth faces. Some of the phenomenal crystals, taller than a man, "survived" hundreds of millions of years to reach us untouched.

Crystal after crystal, year after year, Ilia Deleff collected patiently and with great care all those giants that were in danger of crumbling, to be used for various industrial purposes. When in 1974 a French delegation visited Ilia Deleff's yard and warehouse in Governador Valadares, the state of Minas Gerais in Brazil, its members were struck by the large quantity of giant crystals. Such a sight could not be seen anywhere else in the world.

The French national collection that we purchased from Ilia Deleff contains exceptional samples and is perhaps the most attractive one in the world. Ilia Deleff's thirty years of collector's activities in Brazil preserved for the world a unique natural treasure.

History will confirm that he had good reasons to insist for this fantastic collection to be preserved and to require that it should be displayed in its entirety – for the joy and admiration of the two million visitors that have already seen it in our museum.

Paris, 10 August 1995

PROFESSOR DR HENRI-JEAN SCHUBNEL
National Museum of Natural History, Paris

➲ Fig. 1. A general view of the exhibition of the Deleff Collection – Giant Crystals; National Museum of Natural History, Paris.

Nothing is impossible in life.
Everything can be achieved,
but one needs a strong desire and will.

MY FATHER

The desire of every human creature to look into the new and the unknown has been here since ancient times. Very often, this desire is oriented towards one particular destination and in the course of time, in so far as the object of curiosity becomes more and more familiar, our love for it grows too, as well as the desire to possess it. Thus, slowly and imperceptibly, the collector's passion is born, which in many cases leaves an imprint on our whole lifetime.

The history of my life is in fact the history of the realization of a dream that conquered my imagination and ruled over it for a long time. Enchanted and captivated, I followed this dream on distant and unknown paths and roads, with the zeal of someone who had decided to reach the final destination at any cost. It was not very clear to me how I would realize it. I only knew that I had to go forward, on the wings of hope, and with the unfailing desire to succeed.

The road to success turned out to be long and heavy, full of unbelievable adventures, risk and hard work, the result of which is one of the dearest achievements of my life – THE COLLECTION OF GIANT CRYSTALS, the living book of nature, revealing to us the wonders of the stone kingdom.

I often ask myself – what makes me love these phenomenal crystals so much, collect them and preserve them? Is it because I had really fallen in love with them, captivated and enslaved by their hidden light and brilliance, by their mystery and speechless grandeur? Wasn't my passionate desire to penetrate their "life", to peek behind their ornate facets, also a desire to find in them tranquility for my craving spirit and inner harmonic balance? Let anyone judge for oneself.

I am really convinced that EACH GIGANTIC CRYSTAL IS A LIVING BOOK THAT CAN SERVE EVERYBODY FOR ENLIGHTENMENT. I believe that one day the secrets of nature written on the pages of "the stone books" that I gathered all my life with love, labour and persistence will be studied to the end and their mystery unravelled by the future generations – and this would be the greatest satisfaction and the highest award for me.

ILIA DELEFF

➲ Fig. 2. The author Ilia Deleff among giant quartz crystals of his collection; National Museum of Natural History, Paris.

Fig. 3. A rarely large, transparent and pure group of quartz crystals with the shape of a gothic cathedral, 116 kg; the Deleff Collection.

THE JOURNEY OF ONE'S LIFE

IN ONE'S NATIVE HOME

I was born on 3 August, 1921, in Zlokuchen (the region of Shumen), situated in the beautiful valley of the river Goljama Kamchija, not far from the Black Sea, famous for its beaches of "golden sands". My father was a farmer and a businessman, my grandfather on my mother's side was a colonel in the reserve who had taken part in three wars.

From my childhood I had a strong attraction to nature and my soul felt like a free bird whenever I had the chance to rove with my brothers along the beautiful banks of the river, where the birds' songs and the abundant vegetation awoke a desire and a longing in me for freedom and for distand and unknown lands.

Thanks to my father, an exceptionally hardworking and industrious man, our life improved in the course of the years. He wanted to see his sons educated and did not spare his labour and resources towards this aim. The valuable qualities inherited from him, as well as the examples of diligence and industriousness that he set and permanently showed to me, helped me a lot later for my success in life. My father constantly persuaded me that there are no unreachable points in life and that if initially I fail I must try again, and if I fail again I must be sure that the third time I will be successful! We – he and I, carried to the end many of our undertakings and this turned into a great training for me in the field of trade contracts and business relationships with people.

As a boy at secondary school in Shumen, separated from the direct influence of the family environment, I started to adapt to a different kind of life and, together with the formation of my character, some ideas and dreams started to take shape more clearly in my vision. Geography was my favourite subject, and the stories told by our teacher about South America and especially about the Amazon lands revealed to me a wonderful, incredible fantastic world, until then completely unknown to me. I was greatly amazed by the description of the jungles, the Amazon river – kilometers wide, the great natural (over and under the ground) treasures, the primitive resources and the hard labour done by black people and Indians for their extraction, as well as by many other things amazing and captivating my young imagination. It was precisely then that the longing emerged in me to reach this wonderful world one day and to devote myself to seeking and finding natural treasures (gold and precious stones). This youth's longing conquered me forever and gave an early orientation in my life.

➲ Fig. 4. A general view of some samples ("A Megacrystal Quartz Pantheon") from Mr Ilia Deleff's private collection in his home in Brazil.

It was indeed very early in my life when I started to feel a desire for independence and a craving to be on my own. My imagination – of a young man – was endless. I was guided by the irresistible desire to show that I can cope alone, without anybody's help, with the difficulties in life. To a certain degree, this was due to the experience that I had accumulated, helping my father in his trade activities. Meanwhile I had attained my majority.

In 1939, after the declaration of the Second World War, I was called on to do my patriotic duty – military service. I was enrolled in the aviation (Third Airborne Jambol regiment) as an air gunner. I took an active part in the military activities against Germany, fighting in the First Bulgarian Army, at the front in Yugoslavia, under the command of General Stojchev.

After the end of the war in 1945 I returned home with the feeling that I had fulfilled the duty to my country. I resumed my everyday activities, which were very far from my cravings and visions of the future. The war years had not only seasoned my character, they had formed new horizons for my previous dreams.

Immediately after the war, the economy of the country was in a very bad state. The political and the social conditions were directed to a new trend – against private property and enterprise. The revolutionary period of insensible and merciless "retribution" started. I felt that insurmountable barriers were being raised before FREE and CREATIVE spirituality. My feeling of uncertainty for the near future grew. I was worried and concerned about what was in store for me – I saw no chances and prospects. I tended to think more and more often that my wonderful dream to see Amazonia would only remain an illusion. I was permanently thinking about how I could find the means and the way to go there. I realized that that would be very difficult, even impossible, but still I did not lose heart and used to recall some of my father's wise advice: "Nothing is impossible in life. Everything can be achieved, but one needs a strong desire and will."

On a hot Sunday in August 1946 it was by sheer accident that I came across a newspaper in which I read that, according to an agreement made between the two countries, the Czech republic wanted to recruit workers from Bulgaria. Suddenly, a spark went through my mind. Perhaps this was a most unexpected chance for me to start on my way that might lead to the achievement of my great dream, and that I should not miss this chance! I started to act

immediately. As I had the image of a neutral youth who did not belong to any party and who had taken part in the war against Germany, in just a couple of days I was in possession of a passport. It gave an opportunity for the opening of a new page in my life. This was the first step to the distant, dreamed-of lands.

ON THE WAY TO THE UNKNOWN

My decision to go to work abroad had a tormenting effect on my parents. They fell into despair in the face of the circumstance. Endless conversations ensued in which I was fervidly persuaded not to leave them, but I stuck to my decision and kept saying that I wanted to be free, to try to realize the dream of my life. My mother's crying did not help, too – although I loved my mother very much.

Parting with my parents, especially with mum, was heart-breaking. All in tears, she was trying to give me her mother's instructions, but the grief had clenched her throat so that she could not utter a single word, she only hugged me to herself. The blessing of my father, who took me to the railway station in the cart, was accompanied by tears – it was for the first time that I saw tears flowing down from his eyes. "Good-bye and have a good journey, son! May God protect you!" – he mumbled, hugging me in a father's last embrace. It was as if he foresaw that our parting would be forever.

I jumped onto the train and pressed my face onto the window, because tears were flowing out of my eyes, too. "Forgive me, my dear parents, good-bye my native land, and you, my beloved Kamchija valley!" Slowly and imperceptibly, the train slided along the platform and started its journey through the beautiful gorge, to take me to other unknown valleys and new horizons – such that I could then not even imagine. I strained my eyes to see my native land in the distance for the last time, as I listened to the rhythmic song of the wheels whispering in my ear that, from now on, before me lay the unknown.

It is hard to describe all the feelings and thoughts that disturbed me while departing and during the long hours of this journey. Something seemed to suggest to me that I had really

➲ Fig. 5. Quartz crystals of giant dimensions and the perfection of crystal faces: in the middle – a rock crystal overgrown with subparallel individuals, on the left and on the right – a morion the Deleff Collection.

started my long craved-for and hard journey. I was excited and troubled. My anxiety increased and turned into fear – that is hard to describe, because of a very serious incident that happened at the Sofia railway station.

I was standing at the window of the train when I saw a militiaman walking on the platform (a former classmate of mine from the secondary school who was expelled for bad behaviour and gambling). He was a very simple and malicious boy. We said hello and he immediately inquired where I was travelling to. Suspecting nothing, I told him I was going to the Czech republic to work there, and I sensed right away that I had made a huge mistake. His face suddenly became dark and he started to threaten me openly, saying that a son of a bourgeois, such that I was, according to him, ought not to go abroad. He hurriedly disappeared into one of the station premises. I realized that he had not forgotten the bitter row that had burst betwen us when we were at school, and now he had decided to take advantage of his position in order to harm me. And I had not been mistaken.

Several minutes later two militiamen entered the train car and started asking around which of the passengers came from Shumen. I was sure they were looking precisely for me. Although I was scared to death, I managed to keep my composure and to remain silent, as actually I was not from Shumen, I had only studied there. They started quarelling with other boys. Finally they arrested one of them and forced him to get off, and the train left the station immediately after that.

I will never forget these moments. I was overwhelmed by fear and shock, such that I had not felt – even at the war front. I sat in the train with bated breath, feeling cold shivers down my spine and a stream of cold sweat on my forehead. I clenched my teeth and strained all of my will in order to appear calm. I expected that as soon as we reached the border, they would find me during the passport check and would force me out of the train. When the train stopped at the Yugoslav border, my heart was going to burst. But, in spite of my fears, the passport check went well! We were already in Yugoslavia and I simply could not believe I was safe. What a paradox indeed! Just a year earlier, I took part in air battles with German fighters and I did not feel such a fear – even when our plane received eleven shots from the German artillery and we miraculously managed to return to our base. I had fought bravely for my country, I had risked

my life for it, and now (because of the meanness and malice of this man), I had a feeling of enormous joy and relief that I had managed to leave my country.

MEETING EUROPE

After three days of travelling through towns and villages of Central Europe ravaged by the war, I arrived in the Czech republic. It was October 1946. Without any delay, I started to work and to study the language with great zealousness. I worked hard for three months and at the end of December I already had enough knowledge to be able to make myself understood. I also saved some money.

A snowy winter came and I decided that it was time to get acquainted with the famous capital of the Czech republic, Prague, that made a great impression on me with the standard of

living and the rest of its beauties. The city really appeared "golden" to me and I said to myself that Czechs had a good reason to call it that way. Here I quickly made friends with some Bulgarians and Czechs who used to gather in the centre of the city, around Vaclav square. I was interested in everything, especially in opportunities to make money fast.

My inborn flair of a tradesman and the experience I had accumulated working with my father, as well as the post-war conditions of deficit of different goods allowed me to earn some good money in a comparatively short time, by selling cigarettes. I tried to economize and to put aside as much money as I could, because I knew that to go to South America I would need a considerable sum of money. I could not rely on help from anywhere as I had no close relatives and friends.

It was not very clear to me at all exactly how I was supposed to fulfill my intentions. Very soon, after gathering some information, I realized that the reaching of my final aim – the distant America that continued to attract me uncontrollably, was very problematic. My passport was valid for the Czech republic only, and acording to the information I had the possible route I had to follow in order to leave Europe started from Austria. I had also learned that in Austria there was a great demand for saccharine and that they paid for it well. Day and night I was at my wit's end and made plans about what I could possibly do. Finally I decided that, however hard the road was, I had to go forward and fight with all possible means in order to reach the country so much longed-for!

The first step to be taken on this route was my passage into Austria. I bought a considerable quantity of saccharine in Prague and headed for Slovakia.

With the help of some recommendation given to me I contacted a Slovak in Bratislava who had excellent knowledge of the border and carried out illegal trafficking of people into Austria. I paid him a considerable sum of money in advance and as soon as night fell we headed towards the border. When we entered the protected zone, crawling, the border policemen tracked us with their searchlights and started shooting. We lay in the darkness without movement, our hearts beating thunderously. About ten minutes later we started crawling again and finally stopped when the outlines of the first houses of the borderline Austrian village appeared before us. My Slovak companion explained to me that we were in Austria already, in the Soviet occupation zone, and started on his way back.

The rest of the night I spent crouching in a cabin, shivering with cold and anxiety. The first light of the morning I greeted with relief. I managed to reach the railway station and took the train to Vienna. My ordeals, however, had not come to an end. I experienced another terrible shock when an inspection team, together with Soviet patrolling soldiers, found me and I was in danger of being sent back to Bulgaria. I was terrified. Fortunately, fate was merciful to me once again and everything was all right. I found myself in Vienna. I felt free, and as if I was born for the second time.

NEW ORDEALS AND RISKS

In the February of 1947 Vienna was a depressing sight. The devastation of the war that had brought suffering and death to all the people could be felt everywhere. People were sad and troubled. The sounds of the music of Strauss, favourite for the people of Vienna, could not be heard anywhere at all. Over the city, separated into four occupational zones, hunger and misery reigned.

I managed to find the city market where I had the luck to get acquainted with some Bulgarian gardeners and to start to work for one of them. The garden where I worked for several months was near Vienna. During the time I worked there I managed to improve considerably my knowledge of German and, thanks to my employer, I managed to obtain an identity card, which was of great importance for me.

Meanwhile, I sold the saccharine I had broght from the Czech republic at a profit and, along with the savings from my scanty wages, I improved my financial situation again. This made me think of the next stage of the hard plan I myself had drawn.

I learned from some students, friends of mine, that in the city of Graz, situated in the British occupation zone, there was a representative office of an international immigration organization, through which one could immigrate in different countries. But, to reach Graz, I had to pass through new ordeals, associated with great risks. I had to muster up a lot of strength and courage to be able to pass through two occupation zones. I made the "journey" covered up with newspapers and

parcels on the floor of a post-office pick-up truck, travelling through all zones. This drained again most of my finances, as I had to pay a large sum of money to the driver of the truck.

I arrived in Graz without any "incidents", i.e. without being found by the inspectors in the two occupation zones. Here, however, a new disappointment lay in store for me. I immediately appealed to the immigration authorities to be admitted to an international organization for refugees. After two weeks of intense expectations, I received a negative reply, as I was not a political immigrant. I had nothing else to do but to manage on my own.

I established contact with various people in order to be able to collect information and make up a plan as to my future actions. I went to Insbruck (not far from the Italian border), where I learned that in Rome, in the Vatican system, there was a Bulgarian, a catholic priest, who was serving there and who was ready to help any of his compatriots wishing to immigrate. I did not consider this information very reliable but as I had no choice I decided that I had to take a risk again and try the only opportunity. I wasted a lot of time and considerable efforts to be able to deal with the new great problem – the passing of the Italian border. Soon after that I realized there was only one way for me to go to Italy – to cross the border through the high Alpine ridges. A new serious test for my will, endurance and good luck was in store for me.

MY ODYSSEY IN ITALY

I went to a village near the Italian border, not far from Brenero. I made contact with an old Austrian man who knew all the mountain paths and who, for a considerable sum of money, agreed to take me through to Italy. With a sack on my sholder and my single valuable possession in it – a Leica camera bought in Austria, one dark and misty night I headed for Italy with my guide through the high Alpine paths. I will never forget the difficulties and the sufferings that I experienced during this 18-hour climb up and down along the endless slopes, when twice there was a real danger for me to become swallowed by the precipices beneath my feet. Fortunately, this time, too, my courage was accompanied by good chance!

One early and fresh spring morning I was at the railway station in the city of Bolzano. Exhausted and dirty after the distressing journey, I could not believe that I was already in fascinating Italy. At last, I took a seat in the train to Rome and I sighed with relief, having left the troubles behind my back. Alas, this was only for a couple of minutes. The train conductor came and after requiring and inspecting my ticket, he made me understand that he wanted more money. I could understand nothing out of the stream of words he was pouring onto me and, as I had a ticket, I thought he was demanding something like a bribe. While I was bringing myself to my senses, the conductor vanished, but shortly afterwards he appeared again, this time accompanied by a carabiniere. I was horrified when the latter asked for my passport and started to inspect it in detail. He did not understand Bulgarian, so he could not understand that I had no visa. Still, to show proficiency, he asked me whether I was an Englishman, and when I nodded, he said my document was all right but I had to pay a supplement charge – for the difference in the price for a fast train ticket. Due to my language inability, I had bought a ticket for an ordinary train. Luckily, there was somebody who translated everything for me and helped me understand how I could deal with the situation. I paid the money required, the carabiniere retreated and perhaps I could finally have some real rest and joy. Weren't my adventures coming to an end?! I wasn't aware then that they were only beginning.

At last, I was in Rome. I was struck by the magnificent building of the Rome railway station, by the huge crowds of people and the great commotion around. I was asking myself what my fate was going to be in this enormous unknown city, in this country whose language I did not understand. I had only a couple of liras in my pocket and the camera. I feel unable to describe the vicissitudes I went through and the hectic going round Rome, until finally I got to the priest I was looking for. It was incredible but, thanks God, this time I made it too! At last, I heard Bulgarian speech again. The man received me gladly. I stayed with him for several days and then, thanks to his protection, I was admitted to an immigration camp not far from Naples.

The camp was overcrowded with a cosmopolitan human multitude. There were many women and children. The conditions of living were miserable, the food was extremely scanty and the stream of immigrating people – very weak. After three months of misery, when I was

➲ Fig. 6. A "Quartz Altar" of crystals of rock quartz: the large crystal (**87 kg**) with many colour iridescences; 6 crystals (**10** to **14 kg**) are situated around it; the Deleff Collection.

almost in despair that I was never going to get out of this poor and sorrowful place, the long-awaited and suffered chance appeared.

A commission from Peru arrived in the immigration camp, recruiting specialists for the textile industry. I decided that this was my chance, but ... the problem was I knew nothing about looms. I had to mobilize all my strength and act swiftly. Happily, there was a Bulgarian from Gabrovo in the camp, a specialist in textile. I quickly found a textbook in this field, and with the help of the man from Gabrovo I prepared for the forthcoming examination – a necessary condition for validating the applications. Together with another 40 Bulgarians and with the help of our two compatriots (the man from Gabrovo and another one who knew Italian perfectly) we did well at the examination and all of us were admitted. My joy was limitless.

THE BEGINNING OF A NEW LIFE

After all I had lived through, it was hard for me to believe that I would fly to the Pacific free of charge and would land in the Andes. But here, some days later, on 25 January 1948, at Cinecittà Airport near Rome we boarded a large plane and left the European continent on it. During these long 56 hours, flying over so many famous lands and cities – Paris, London, Island, Canada, Boston, Miami, Panama, Bogotá, Quito and finally Lima, I felt an indescribable, unusual joy. The excitement and the feelings that I had during that flight are deeply imprinted forever in my memory. I will never forget them! Even in my boldest dreams had I not imagined that something like this could ever happen to me! Truly, the miracle had happened – and there was no going back. And from that moment on, new battles and ordeals lay in store.

We were given two days to rest, and then the true specialists in textile made their way for different places and, as it turned out, most of us had to look for some other kind of work. Naturally, the lack of knowledge of the language was a serious barrier against finding some better job.

I immediately started learning Spanish and, thanks to my knowledge of French as well as to my great persistence and ambition, in a couple of months I could already deal with the language, making myself understood.

It was high time I obtained regular documents that, together with my better knowledge of Spanish, would help me go forward in a more confident fashion. I had to part with my only possession – the Leica camera, a true friend that had gone through so many ordeals with me. At the expense of this parting, however, I settled my status by obtaining regular identity documents. I could already move around freely and look for an appropriate job.

I was very glad when I started working in a silver mine, not far from Lima. It was for the first time in my life that I saw such a large factory for the extraction of different ores and with such a multitudinous workers' team. I worked there for about a year. I lived rather modestly and managed to put aside some money. Then I made a decision that I would have to try something else. I would have to start an activity in which I would be able to apply my knowledge and skills.

I had the chance to meet two Poles, immigrants, and we started together the exploitation of a concession in the timber and furniture industry in La Siera de los Andes jungle. For half a year we laboured in very hard conditions, with very primitive tools, among

semi-civilized Indians. We heaped a large quantity of wooden material, transporting it was extremely difficult. This forced us to sell – on the spot, although rather unprofitably, the material obtained and to put an end to our enterprise. We split the money received and everyone went his own way.

I already had enough financial means, so I decided to get acquainted with the countries of South America, by using the travelling for exploiting the opportunities for more profitable work. I travelled around Chile, Bolivia, Ecuador and Columbia. Everywhere I started different jobs but I did not forget even for a moment the long-craved Amazonia! I was all the time asking myself how I could manage to earn enough money to realize my final aim. How many more interim stations were waiting for me on this difficult road? Nobody could tell me this, and I myself was the last person to guess.

The desire for quick success and profit made me turn to Venezuela – the country much talked about at that time for its oil deposits. I decided to try my luck in the oil business, and if fate

 Fig. 7. A giant crystal of morion (of the 'window' type, **192 kg**), the state of Minas Gerais; the Deleff Collection.

had decided so I might, just like so many other people, succeed. The travelling lasted a whole week. I had to cover several thousand kilometers on different vehicles – a bus, a ship, a train and a plane. I still cannot forget the long dreary hours that seemed endless to me, while we chugged along the 1 500-kilometer stretch – a desert, along the coast of Peru to Ecuador. I was strongly impressed by the banana plantations in the valley of Guiaquil, where we travelled on the train for almost an hour and there was no end to these plantations.

Unforgettable are also my impressions from the city of Quito, the capital of Ecuador, situated at an altitude of three thousand meters. One could hardly breathe here and everything was extraordinary, fantastic and strange to me – the colours of the Indian costumes, the variety of tropical plants and animals, the seemingly endless mountain chains. I left this wonderful world and found myself in Venezuela, where I managed to find work in a branch of the Shell Company for prospecting and extracting oil in the region of Orinoco. The work was well paid and very interesting. Here I enriched my knowledge in geology and mineralogy. Around the river Orinoco and its numerous tributaries, oil deposits on a large scale were being found, iron and bauxite ores, as well as diamonds.

My permanent meetings with miners – diamonds-seekers, enflamed my imagination more and more, as well as my interest in the techniques of finding and extracting diamonds. Thus, one day I decided to leave my job in Shell and join the multitudinous army of diamond-seekers.

Close to the oil rigs where I worked there is a small river – Santa Rosa de Marcelo, along which diamonds are extracted, suitable mainly for industrial purposes. After many efforts and long negotiations, I managed to buy at a reasonable cost a six-kilometer stretch on both sides of the river. I registered my new property and organized the work according to all known rules, but unfortunately the extraction of the valuable shining small crystals was very scanty. This forced me to give up exploiting my mine and to part with it. The finances received after the sale gave me self-confidence and the chance to devote myself at last entirely to my basic aim – to reach the long-craved Amazonia.

TRAVELLING THROUGH THE JUNGLE

On the wings of hope and already feeling much more confident, I started my journey by setting off from Orinoco on a road that was hard, painful and full of vicissitudes, through some almost impassable jungles.

I set off tentatively, armed with a machete in my hand, along the multitudinous paths through the thick ancient forests, with no orientation about the correct and appropriate way and endangered by all kinds of animals. At last, thanks to God, after this strenuous journey, a rather wide path shone before my eyes. It led to the frontier town of Santa Elena. And finally, after so many risks and efforts, I found myself on the territory of Rio Branco, in the large region of the Amazon river in Brazil. It seemed to me improbable – but I had succeeded, in spite of all.

What would the country of my child dreams offer me? A country reached through so much labour, persistence, misfortunes and adventures? One thing was certain – new ordeals and hard labour lay in store for me.

According to a recommendation, I settled temporarily in the town of Boa Vista, because I had gathered information that not far from here, in one of the tributaries of the Amazon river diamonds of high quality were extracted – transparent and pure, ideal for the gem industry.

The first thing I did was to buy a motor boat and equip it well with all that was necessary – all kinds of tools and implements needed for mining, a hammock, different kinds of food and tins. I had no idea what place I would settle in and how long I would stay there, what environment I would find myself in. But I took pains to prepare myself for all kinds of surprises. Finally, I added a gun and a revolver to my equipment. These would enable me to hunt and to feel safer among the inhabitants of the jungle.

I made contact with traders of diamonds and I obtained detailed information on the location of the most interesting mine. Prepared in this way and having complete miner's equipment, I started on the last stage of the road to my dear wish – "to find the treasure".

After two days of a long and strenuous travelling, full of impatience, I arrived in the long craved-for diamond mine. A river opened before my eyes, about forty meters wide, with a long

➲ Fig. 8. Samples of rock crystal with inclusions of long prismatic polychrome tourmaline and precious topaz from the state of Minas Gerais; the Deleff Collection.

peninsula cutting into it, strewn with large beaches, perching on which were cabins, most primitively built.

I managed to join the inhabitants of a largish cabin. I quickly made some acquaintances, as many of the miners expressed curiosity and a desire to get acquainted with me – for very few of them owned a boat and equipment like mine. This soon enabled me to gather information on the conditions and the prospects for extracting in this mine.

The predictions did not instill any optimism, but I was there already and I had to try my luck. Very soon luck appeared in the person of an old miner who came to me, introduced himself to me and invited me for a serious and discreet conversation. He offered me partnership in the exploitation of a sector (a quarry) with a high concetration of diamonds, found by him and his brother up the river. They had finished their food and had no boat, and I possessed very good equipment. According to the conditions in the mines, the person who could offer that – after negotiating, is taken as a partner with the right to 50% of the production. I did not hesitate long, agreed and on the very next day we started in my boat up the river to the new mine found by the two brothers.

The distance that took the miner three days to go down to the miners' settlement that I already described we covered in my boat in seven hours. For me these hours were full of enormous impatience, new illusions and justified excitement and curiosity. We entered deeper into the jungle and the landscape became more and more virgin and beautiful.

We finally arrived. We immediately went round the place supposed to have an increased concentration of diamonds, explored the beaches, then built our modest camp and decided that we would start work as soon as dawn broke. We had a good meal and went to sleep. But could I go to sleep! I was so excited by everything that happened to me during the last several days. I was asking myself whether this was not just an adventure and what the outcome would be. Everything around me was like in a fairy tale, as if unreal. Under the baton of an invisible Kapellmeister, the jungle, surrounding us from all sides, offered such an exemplary concert that I had never heard until then.

All kinds of cries and voices were heard. The parrots and the wild hens competed and fought for the solo parts, innumerable unknown birds chirped, and somewhere from the distance the bass roar of the large predators came. We only hoped they were not going to visit us!

A YOUTH'S DREAM COME TRUE

A fresh morning came. It was so beautiful everywhere around! We woke up and after refreshing ourselves and having a good breakfast we got to work. At that time the extraction of diamonds along the rivers was done in an entirely primitive fashion, mainly through a manual washing of the material (the mixture of gravel and sand) in a sieve that moves in a rotating manner in the water. Due to their higher relative weight, diamonds fall to the bottom, and when the sieve is overturned on the bank they remain on top of the heap and are picked up manually. The work done in this fashion is hard and unproductive for a single man. Usually we worked in groups of two or three people, and in this case our group was such and we worked in this way. Some teams worked by using divers who, using buckets, scooped out the river sand from the bottom of the deep pools and then sifted it. Floating platforms (dredges) could also be used to scoop the sand from the river depth. The principle behind the different

ways for extraction is the same, but extraction is determined mainly by the presence of diamonds in the explored sector, and this is primarily a matter of chance – rules and logic do not exist. I had the chance to become convinced in this and to assimilate it very well precisely during my practical work in the mines. It became clear to me, and I was finally convinced that the high price of a diamond is determined not only by its qualities – size, strength, transparency, pureness, colour and shine, but also by the fact that larger diamonds exist in small quantities, they are rare, their extraction is very difficult and happens by chance.

Let us now go back again to the sandy bank that fresh morning when I, trembling with curiosity and tension, together with my new comrades, started to take the heavy buckets out of the river, filled with sand. Until noon we made two large heaps and in the afternoon started sifting. I was full of attention and diligence. This helped me master the technique of sifting in only a couple of days' time and to deserve my comrades' praise. We worked for days on end, hard and without any rest, but although we gazed constantly we could not see any of the craved shining small crystals. Fate was simply playing a game with us. My comrades, having got accustomed to patience and hope, endured this calmly, but for me this week of fruitless efforts was a serious test and a seasoning of the nerves because apart from the anger and the fears that we were going to find nothing, I had to try to keep my composure in front of my comrades. At last, the first success came – in the sieve with which my comrade was sifting and in which I had just poured my full bucket a wonderful bright ray shone! It was a small, transparent, well-shaped octahedral crystal. I took it in my hand, trembling with exitement. My joy was indescribable. I was happier than a child having just received a favourite toy. Had the fairy-tale dream come true? There was no doubt that that was so.

Inspired by the success, we started taking out the sand from the same place even more zealously. Until the end of the day that turned out to be so happy for us we got another three diamonds, one of which was rather large – about 3-4 carats. In the evening we celebrated the event by opening a bottle of brandy and drank a toast with a wish – for the good chance that had visited us at last should stay with us, and may God help us!

I spent another sleepless night, but this time I could not feel what was happening around me, as my excitement was great. My soul was delighted. I had caught up with my winged youth's

dream, however improbable that might seem to me. Now I had to work hard to make it come true. Again I remembered my father's words "anything can be achieved – only if one has a strong desire and a will for success".

We continued our work with great enthusiasm and at the end of the third week the small bottle in which we gathered the diamonds that we found was already full. That week was especially fruitful because there was one day in which we extracted ten small diamonds. The diamonds, sized 2-3 carats, were only several, but these and the smaller ones were of very good quality, suitable for jewelry processing.

After a month of good work, we decided to take a short rest. We hunted for some time in the jungle, which at that place was a real heaven for hunters, and then we agreed to go down to the settlement of the old mine and to sell our diamonds to the purchaser (the first diamond found I kept as a souvenir). After the sale, we split the sum of money and each of us received several tens of thousands of dollars.

Our success strongly raised the spirits of the miners in the settlement and many of them rushed to the place where only we worked previously. Here it is necessary to explain that in these extraction sectors everyone had the right to work wherever he wanted to and to do whatever he deemed right. Of course, fights occurred too, and sometimes arguments were settled by the use of shots or a knife, and the right belonged to the one who was more skillful and fast.

The rushing of so many other miners to the mine found by us became a reason for our production to decrease strongly. We started to look for new places. We worked in very hard conditions and lived a life without any convenience, but in spite of our persistence and stamina, we could not repeat our initial success.

In this period, apart from the washing of sands, I also dealt with transporting miners in my boat to look for new sectors for working there. My contacts with them made me think of some new aspects of the work. I found a book on the mineral deposits in Brazil that I made good use of in my activities. I spent great efforts for the enrichment of my practical knowledge in the field of gemology. At the same time I finished a special school in mineralogy and gemology in order to be qualified as a mineralogist and to obtain the necessary documents (a licence), giving me the rights to carry out mining investigations, extraction and trade with precious stones and

minerals. Later I also received a licence from the Ministry of Mining for the export of these minerals.

During the years I worked in the diamond mines, I considerably increased my earnings and my experience. I became convinced how difficult it was to extract diamonds. In spite of the charm of the jungle and all the romantic feelings and adventures that we experienced in these unforgettable places, I gradually realized that the "treasure" that would help me to succeed was buried elsewhere. After reading many textbooks and making contacts with a large number of diamond traders I realized there were other regions of Brazil very rich in the different types of precious stones, of all colours, and also rich in precious minerals, and where the conditions for extraction were much easier. Without any further hesitation, I decided to take leave of the jungle and head for this new El Dorado, completely unknown for me.

AN ENCOUNTER WITH THE WONDERFUL WORLD OF CRYSTALS

I said farewell to friends and comrades, took the equipment with me, left the boat in the mine and started on a 3500-kilometer long journey, passing through Manaus, Recife and Bahia that would take me to the famous Brazilian state of Minas Gerais, of the natural resources of which I had read and heard so many unbelievable and interesting things. It was 1957. I settled in Governador Valadares, a town with some fifty years of history, today having about 180 thousand inhabitants. It is situated in the Vale (valley) do Rio Doce, along the great river Rio Doce. This valley, several hundreds of kilometers long, is one of the richest in minerals and precious stones in Brazil.

In the state of Minas Gerais there are many mountains and plateaus with huge pegmatite deposits. Quartz is a very common mineral and can be found almost everywhere in this state, but the one that is transparent and clear (a rock crystal), suitable for industry as a "piezoelectric" ("piezoelectrico") or for optics is mainly found in the Vale do Rio Doce. Colourful precious

stones such as emerald, aquamarine and other variegated beryls, tourmaline, topaz, garnet and other minerals are extracted in an inexhaustible abundance and are brought onto the jeweller's market worldwide (Fig 3-8).

I needed just a very short time to become convinced that I had really found myself in Ali Baba's cave, therefore, without any hesitation, I decided to settle in this town. All the people around me (Indians, white, black) dealt with the extraction and trade of precious stones, minerals and especially of mica. Again I was overwhelmed with enthusiasm and a desire for action. I immediately bought a Jeep and hired an experienced driver who knew very well the roads of this huge state (the territory of the state of Minas Gerais is larger than that of France).

Thus my endless journeys began. I roved through all the mines, even the smallest ones. I wanted to become closely acquainted with all the deposits and to learn as much as was possible about them.

During the Second World War as well as many years after it, the American government invested a lot of capital in the state of Minas Gerais to extract industrial quartz ("piezoelectric" and "optical" quartz), recognized at that time as a strategic material, used in the shape of fine tiles, for filters and oscillaltors in various electronic appliances, mainly for military purposes.

In a very short time many societies and groups of miners formed for finding and extracting quartz. Hundreds of thousands of miners, seduced by the thought of making easy and fast money, rushed into activities of this kind.

It is common knowledge that different types of crystals of minerals were formed together in pegmatites. Quartz is accompanied by feldspar, tourmaline, mica, beryl, garnet and many other minerals, many of which are precious stones. In spite of the circumstance that the major aim of the miners was industrial quartz (transparent, colourless and pure), together with it precious minerals were also extracted – and there was no shortage of customers for these, too.

Most of the mines in the state of Minas Gerais constitute tunnels, about 2 meters high and 1,5 meters wide, and their length is according to the length of the vein. Of course, there are many such mines, looking like caves, and in others extraction took place in the open. Going round all these mines, I came upon a fact that shocked me. While taking out of the earth's depth crystals that were unfit for any of the industrial applications described, the miners broke them

into pieces and threw them aside because there were no customers for them. Unique creations of nature, worthy of any prestigious collection, perished in this way. Wherever I travelled, I came upon the same picture – of mercilessly destroyed marvellous mineral samples.

I could not reconcile with this devastation of the masterpieces of nature due to the ignorance and the lack of information of the miners. I realized I had to act. I started taking rounds of the mines and giving talks to the miners. I took pains to persuade the miners that the crystals that are inappropriate for industrial purposes have another value (for museums, collectors or for decoration). I asked them persistently to listen to me, I advised them and gave them instructions as to how they should dig out these crystals without hurting them and, for becoming even more convincing, I offered that I would buy them off. At the beginning my explanations and instructions were met with disbelief and ridicule. They even thought I was foolish – buying these "unworthy" crystals. But I bought them and collected everything that was of interest in my terms. I thus managed to collect many valuable samples and I continued to buy them, because I had gradually won the confidence of the miners and they started to offer me their samples that until then nobody had been interested in, and to keep such samples when they found them.

I continued this pioneering work for several years until I became convinced that my efforts had not gone in vain. I received recognition for this hard and persistent activity of mine in 1971, during the first International Exhibition in the town of Governador Valadares, the major centre for the extraction of precious stones and minerals in the state of Minas Gerais. Many specialists in mineralogy, and especially journalists wrote and praised my educational and charitable activity for saving, keeping and developing the sphere of extraction and trade with mineral samples.

My desire and my persistence to acquire well preserved crystals at the same time contributed for the miners to realize that out of the beautiful and whole samples one could make good money. They started to treat me with great respect and many of them expressed their gratitude and recognition for my valuable directions and advice. Very often I went into collaboration with some of them, investing money and supplying equipment for a more effective extraction. From time to time, some large crystals were found whose beauty and grandeur

enslaved me. Some giant quartz crystals had a high scientific and museum value. Unfortunately, I could not save everything from being destroyed or sold for industrial purposes. I fought a fierce war with the purchasers for every giant crystal that I managed to take out for keeping and it wasn't once or twice that I ran risks and had threats for my life but I could not act in another way. I was captivated and enslaved by the beauty and the grandeur of these fantastic entities – giant crystals, creatures of nature, the most perfect artist! Not only beauty but also the age, the size and the unimpeachable growth of the crystal, as well as the heroic travelling of these exceptional "creatures" from the depths of the earth to its surface awoke in me a deep respect and love for them.

THE BEGINNING OF COLLECTION MAKING

The finding of a giant crystal was always for me a happiest event. I felt proud and happy to present it and show it to the people, to enjoy it and to study it, because I am deeply convinced that extremely valuable information is recorded in every such crystal. It represents a LIVING BOOK that can serve anyone for education! Here is why I did not spare any efforts and resources to collect and keep these precious stone "books" (Fig. 9).

Many years passed, in the course of which I acquired all kinds of mineral samples – small-sized, middle-sized, common or rare, but large crystals appeared only from time to time, by accident, and this was the great whim of nature. To come upon a large crystal, one needs to find and take out thousands of small and middle-sized crystals. For extracting such a quantity of crystals, the course of a number of favourable circumstances is necessary. For example, with the beginning of the Second World War, a new technique was used that imposed the application, and hence the demand for high-quality and defect-free quartz. Nature had lavishly gifted the state of Minas Gerais with numerous deposits of such quartz. Precisely for this reason, large capitals were invested in this state at that time, and over three hundred thousand miners were employed there for the extraction of quartz crystals. Tens of thousands of tons of this material were extracted for satisfying the world's industrial needs. The extraction of small crystals was

❨ Fig. 9. The author Ilia Deleff with some of the first giant smoky quartz crystals from the Pedra Alta mine in his collection.

very large, while middle-sized crystals were considerably fewer and the finding and mining of a giant crystal was so rare that whenever it happened it turned into a great event.

Perhaps this was predetermined, and fate had wished for precisely the Bulgarian Ilia Deleff to appear exactly during this twenty-five-year period of intensive extraction of quartz in the state of Minas Gerais. Indeed, after covering so many kilometers and undergoing numerous ordeals, it was as if God sent me there purposefully. Finding the unique natural phenomena, I admired them and became passionately involved in the collection and preservation of these "crystal individuals", so important and rare, created by almighty Nature. And if later the French government awarded me the Comandeur des Palmes Academiques order – given to people with merit and contribution in the field of culture, it was precisely because they were convinced in the difficulty of finding so many inordinary samples and making up a collection of giant crystals and in the importance of the preservation of such a mineral treasure, necessary for the education of the coming generations.

THE COLLECTION OF INIMITABLE "GIANTS"

The idea to make a large and rich collection of rare and exceptional crystals was conceived in me as early as I was making my first investigations in the state of Minas Gerais. Such a collection was necessary for me not only because I wanted to admire it but also because it had to serve my professional activity. I dreamed the collection that I was going to gather and that it would have to be something extraordinary and grandiose! I wanted it to be such that it should breathe respect and reverence to me on the part of my clients, colleagues and the miners that I worked with. Filled with such feelings and dreams, I started to materialize my idea. I soon realized that I had undertaken a very difficult task that required a passionare desire and great efforts and exhausted a considerable part of my financial means. But my desire was so strong that I was again ready for all kinds of sacrifices.

Gradually, my efforts and the deprivations I was subjected to started to bear fruit. One after the other, in my warehouse and in my yard some giant beauty would settle – quartz, beryl,

tourmaline, mica or a marvellous amethyst would arrive, causing the admiration and the amazement of all the people visiting me. The beginning was, of course, difficult. I owned quite a few samples of average size and tons of minerals smaller in size; "giants" gathered, in spite of my great desire and impatience, extremely slowly – in the course of many, many years.

Every large crystals in my collection has its personal history. It was well known not only in the state of Minas Gerais but also in the whole of Brazil that I was madly in love with giant crystals. The miners knew that when such a crystal was found it had to be offered to Mr Ilia Deleff, because I would go to any length when I wanted to acquire a particular crystal. Someone could ask me: why and what made me do this? Weren't there other clever people to follow me? In actual fact, it was quite the other way round: many of my colleagues considered me to be a dreamer and did not take any interest in these masterpieces for the only reason that they were no object for profit. It was difficult to find a buyer of such large crystals. But... I was really passionately in love with them and felt deep love and respect as if towards living creatures. It was a great pleasure for me to have them in my yard, to take care of them, to caress them, observe and study them, enjoying simultaneously their beauty and grandeur.

A long period of time passed until a magnificent, large and full collection formed, containing exceptional samples, that was visited by many mineralogists for many years, by competent specialists and enthusiasts. Among all of them, it aroused amazement and admiration, and I received a lot of praise and compliments. Criticism also appeared, however, that it was egoistic to keep for oneself such a huge and unique natural and scientific treasure and that it had to become the possession of all people. I understood everything and I agreed, but deep in my heart I felt I couldn't imagine a possible good-bye with my favourites. I had devoted half of my life to the gathering of this collection! So many memories bound me to every single crystal! I will allow myself the liberty to tell you about some circumstances and to acquaint you with some of the crystals.

The Cuiaté giant weighs 3 000 kg. This is a group of crystals of smoky (dark-brown to dark-grey, transparent to semi-transparent) quartz, placed on a base of feldspar and mica. When this giant was found, I bought it off from the miners in its bed *in situ* in a tunnel gallery, 24 meters long. I was struck by it during my first encounter with it in the gallery itself. I simply could not

➲ Fig. 10. A giant rock crystal **(1 100 kg)** from the Goiabeira mine in the state of Minas Gerais; the Deleff Collection – Giant Crystals, National Museum of Natural History, Paris.

believe that it is possible for a crystal with such monstrous dimensions to exist. I started to observe it, illuminating it with the lamp and saw that it was transparent. I cleaned it and noticed that in reality these were four large crystals, adhering together one against the other and actually forming one group. I was overwhelmed by indescribable joy and amazement, and simultaneously I was alarmed about how this amazing thing could be taken out so that it should reach my collection! I immediately roused everybody around to their feet. Several days of work was necessary to enlarge the tunnel (the gallery) holding this amazing creature. Then we fastened it with steel wires and with the help of four oxen, centimeter by centimeter, after two days of hard work, the proud beauty was drawn out in the open, where under the caresses of the sun's rays it shone with all its beauty and perfection, causing tears of joy and excitement in my eyes.

Hundreds of people came from the nearby village. Everyone wanted to see this wonderful and inordinary crystal giant, to enjoy its proud beauty and its gold-sparkling chocolate colours streaming from its shining body. The event was indeed a great joy for the whole local population. At that time I had a great concern again – how was I going to transport this heap to my warehouse. But as people were very enthusiastic, they all voluntarily undertook to make a road to the mine so that a lorry could be driven to it – to load it and carry it away.

I was full of pride and happiness when I saw the crystal group in my garden and realized that I really owned this crystal, the largest one in ther world. I thought that at that moment it was hard to find a man happier than me. This was a great sensation for the state of Minas Gerais in 1969. Many mineralogists and miners arrived from distant places to see the incredible giant crystals. The Brazilian television shot them and broadcast the film with a commentary that this is one of the exceptional treasures of this Brazilian state.

Another giant with a similar history is the "pyramidal" Goiabeira quartz crystal – colourless, transparent, weighing 1 100 kilograms (Fig. 10). Unfortunately, its history is associated with a rather sad incident. It was found in 1967. Two groups of miners had an argument about who found it first. The quarrel led to the killing of the leader of one of the groups of miners. After this tragic happening, I was invited by the mayor of the village to make an assessment of the crystal and to buy it off, if I wanted to. The money I paid was used to improve the working conditions in the local mine.

The dearest memory I have from the time of finding and collecting giant crystals is the one associated with the Golcunda quartz crystal, found in 1968. I gave its name to the remarkable Golcunda mine, situated twenty kilometers from the town of Governador Valadares in the state of Minas Gerais (Fig. 11-12). This mine is known around the world because large quantities of precious minerals are extracted from it, and especially the magnificent, green and pink tourmalines of high quality, as well as hundreds of tons of industrial quartz. Again I was present during the digging out of the exceptionally large crystal that I later named Golcunda. It is a fragment of a really unbelievably large crystal (about 10-13 tons), found in a tunnel at a depth of 15 meters. There was no technical opportunity for this giant to be taken out to the surface in its entirety, all the more so because after a careful inspection it was established that it was cracked and not quite compact. Different natural processes are often the reason for the appearance of cracks on the crystals, and very few giant crystals are preserved in a perfect state. To reach the crystal, the hill situated over it had to be cut, i.e. some 15-18 m of earth mass over

the tunnel had to be removed, and thus the enormous crystal, which in fact was exctracted in separate fragments, could be revealed. I managed to acquire the two most beautiful and significant of these – the "head" of the crystal, weighing 350 kilograms, ideally transparent and with some tourmaline needle inclusions, crossed in all directions; and the second fragment – weighing over 2 000 kilograms, also transparent, stabbed by many tourmaline needles (Fig. 13-14). The other parts of this fantastic giant were used for industrial purposes.

Unfortunately, at that time, in 1968, the finding of these crystals with unbelievable dimensions and with a serious importance for mineralogical science, passed rather unnoticed for the specialists in mineralogiy. I am still sorry that I did not have the opportunity then to get hold of all the fragments of this enormous crystal or at least to photograph it in its entirety. I will never forget the excitement I felt when I saw it – one of its crystal faces seemed to me to have a length of over 8 meters. Many other less beautiful crystals were extracted from this part of the mine, also about twenty quartz samples, average in size (from 100 to 300 kg), with tourmaline

➲ Fig. 12. A general view of the Golcunda mine near the town of Governador Valadares in the state of Minas Gerais.

Fig. 11. The Golcunda mine near the town of Governador Valadares in the state of Minas Gerais.

inclusions in them, too. I managed to buy off all of them, and I have kept them in my possession ever since, but such an unbelievable giant like the one just described was never more to be found, unfortunately.

Extremely interesting types of giants are the amethyst geodes extracted from the basalt deposits that I found around the town of Iraí in the state of Rio Grande do Sul in the San Gabriel mines (Fig. 15-20). The geodes are dug out of small quarries or shafts, where they are situated at a small depth of about 5 to 10 meters. I saw many geodes of a large length and I was especially surprised by the straight lines along which most of these were situated. Even more interesting is the fact that the large amethyst geodes were drawn out only along this straight line. Whether this is a rule or one of the mysterious caprices of nature, I have not been able to guess even until today.

Several very large geodes were found, for example one in 1976, weighing 16 tons, which unfortunately broke into pieces while being loaded onto the lorry. Many of its fragments are preserved. I had the luck to acquire several giant amethyst geodes: one weighing 2 500 kg, another 2 200 kg, still another – 1 600 kg, and three – 800 kg each.

Fig. 13. A fragment (**2 000 kg**) of a **13-tons** quartz crystal from the Golcunda mine in the state of Minas Gerais with inclusions of long tourmaline needles; exhibition of the Deleff Collection – Giant Crystals, National Museum of Natural History, Paris.

Fig. 14. A fragment (**450 kg**) of a **13-tons** quartz crystal from the Golcunda mine in the state of Minas Gerais with inclusions of long tourmaline needles; exhibition of the Deleff Collection – Giant Crystals, National Museum of Natural History, Paris.

Fig. 15. The San Gabriel amethyst mine in the basalts of the state of Rio Grande do Sul.

Fig. 16. An amethyst geode with a strange shape from the San Gabriel mine, the state of Rio Grande do Sul.

➲ Fig. 17. The author Ilia Deleff in front of the entrance to the San Gabriel amethyst mine, the state of Rio Grande do Sul.

A large part of my colection of quartz giants was extracted from the Pedra Alta (High Stone) mine, near the town of Conceilheiro Pena in the state of Minas Gerais. This is one of the richest quartz mines in Brazil, from which thousands of tons of crystals for industrial purposes and samples for collections are mined (Fig. 21-26). I spent many of my years there because every hill concealed various treasures, including precious minerals. These are large pegmatite deposits. The inhabitants of the nearby village of Baxios say that God was probably a Brazilian because he presented them with vast treasures but at the same time he tore them away from the people, giving them in return lots of perfect creations of nature.

Let me also say a few words about the miners, or "garimpeiros", as they are called in Portuguese – from "garimpo", which means "a mine", or, rather, a locality in which tunnels or pits are dug out to extract different minerals. Miners looking for aquamarine, tourmaline, topaz, chrysoberyl, garnet and other similar minerals, in general, rely on their chances. Still, the probability for them to have luck here is much greater than with diamond deposits.

Many miners make a good living out of their trade, but there are some among them who lose their finances, taking risks. Perhaps about 10% of these manage to make a fortune and to become rich, but these are mainly enterprising people with rather scheming minds. Very few are the happy people who made it from ordinary miners to rich men – as this happened with one of them, Ailton Barbosa.

I had known for a long time this nice and very industrious man who as a young miner had worked for me. Very enthusiastic, he worked ardently and in the course of time specialized in prospecting of gem minerals. Barbosa was really a very happy man who in 1978 found and started to exploit one of the vastest rubellite mines (rubellite is a pink-to-red variety of tourmaline; in their chemical composition these are lithium-containing tourmalines – elbaites) of high quality, ideal for the gem industry. He told me that when he saw what he had found he thought he was in Ali Baba's cave. There, heaped as if in a warehouse, were the rubellite crystals – a luring and an improbable phenomenon, several tons for the jewelry production and another several tons for collections. Fantastic but entirely true!

➲ Fig. 18. A giant amethyst geode (**3 000 kg**) with high-quality amethyst crystals for jewelry purposes from the state of Rio Grande do Sul.

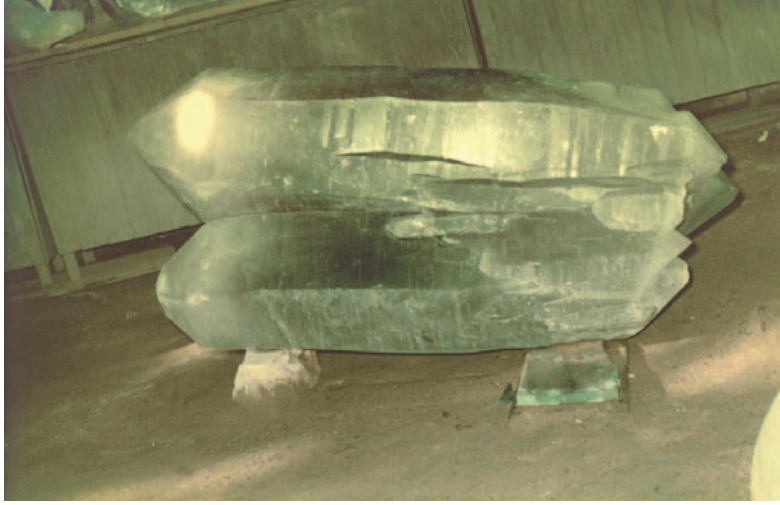
Fig. 19. An amethyst geode with a height of **3.5 m**, the San Gabriel mine in the state of Rio Grande do Sul.

❶ Fig. 20. An amethyst geode with a height of **2.5 m** (**305 kg**) from the state of Rio Grande do Sul; the Deleff Collection.

❨ Fig. 21-22. Two giant quartz crystals (**700 kg; 750 kg**) from the Pedra Alta mine, the state of Minas Gerais; the Deleff Collection – Giant Crystals, National Museum of Natural History, Paris.

❩ Fig. 23. A giant quartz crystal (**750 kg**) from the Pedra Alta mine; the Deleff Collection – Giant Crystals, National Museum of Natural History, Paris.

➲ Fig. 24. Two double terminated giant quartz individuals ("the twins") from the Pedra Alta mine; the Deleff Collection – Giant Crystals, National Museum of Natural History, Paris.



➲ Fig. 25. A giant quartz crystal (**780 kg**) from the Pedra Alta mine; the Deleff Collection – Giant Crystals, National Museum of Natural History, Paris

➲ Fig. 26. A morion cluster of a giant size (**3 000 kg**) from the Pedra Alta mine in the state of Minas Gerais; the Deleff Collection – Giant Crystals, National Museum of Natural History, Paris.

A DREAM COME TRUE

I visited Europe for more than twenty five years to offer my mineral samples from Brazil to museums and collectors, which brought me the recognition of being a pioneer in the field of finding, gathering and collecting mineral samples and giant crystals.

In 1967 I organized a large personal exhibition in Geneva, in order to show everybody the beautiful and interesting Brazilian mineral samples (Fig. 27-29). In 1968, together with a French society, I organized another exhibition in Paris. Almost 45% from the collection of the Pio Mariani Museum in the town of Desio in Italy was supplied by me, as well as a large part of the collection of the La Moineaudiere Museum in the town of Gerardmer in France. Many Western European museums possess mineral samples of various types and sizes supplied directly by me or through my representatives.

In the course of time in many countries of Europe many societies of friends of mineralogy and paleontology were founded (especially youth and student ones), and I permanently

➲ Fig. 27. A yellow gem topaz (**93 kg**) from the state of Minas Gerais from the first exhibition of the Deleff Collection in Europe (Geneva, 1967).

supplied them with valuable materials and samples for the enrichment of their collections. The interest and the "hobby" for collecting nice mineral samples and fossils during the last twenty years developed so much that in many countries, almost in every city, exhibitions are made every year – bazaars for selling, buying and exchanging such samples.

At the time when my collection was in the state of Minas Gerais it was visited by many directors of museums, mineralogists and journalists and became well-known in many countries in the world. People from USA and Japan were keenly interested and made offers for buying it off. For a long time I was trying to make the museums in Brazil become interested, so that an appropriate place for me to organize an exhibition would be suggested, but unfortunately my efforts remained fruitless.

Some museums in Europe showed considerable interest in the purchasing of the collection, but I was not in a hurry. I wanted to choose the ideal place for my favourites.

The person in charge of the Gallery of Mineralogy at the Museum of Natural History in Paris, Professor Dr Henri-Jean Schubnel, after visiting me and seeing my collection in Brazil,

Fig. 28. The author Ilia Deleff during the opening of the first exhibition of Brazilian crystals in Europe (Geneva, 1967).

Fig. 29. A giant crystal of potassium feldspar (orthoclase) from the first exhibition of the Deleff Collection in Europe (Geneva, 1967).

was exuberant and amazed that such a thing can exist. He took many pictures of my collection and it did not take long before the Museum's Professors' Council informed me of their decision to buy it. I agreed with no hesitation, because for a long time I had dreamed for it to make it in Paris – the ideal place that would entirely correspond to its significance. Something that also contributed a lot to the quick making of my decision and to the final agreement with the managers of the Paris Museum was the circumstance that my wife is a Frenchwoman – and it was a great pleasure for me to do something for her country. In spite of this, however, the negotiations continued for a long time, because there occurred various difficulties.

The major initiative came from the Ministry of Education, and more specifically from the Minister, Mr Alain Savari. Many high-ranking officials from the government regarded the idea for France to become the owner of this collection with sympathies and agreement, but the last say belonged to President Mr François Miterant, who personally contributed to the speeding up of the realization of the idea.

I was overfilled with joy and satisfaction that my collection was going to a place where it would be valued so highly. Its importance and its scientific value were emphasized and expressed in a most appropriate fashion. Paris is the place where the science of crystallography was born and developed, and maybe one day it will be the centre where the secrets of the crystallogenesis of giant crystals will have to be explained and studied.

The exhibition of the collection in the Paris Museum and especially its official opening turned into a great feast. It aroused an enormous interest. Many newspapers, magazines and other mass media around the world covered it. Within a year and a half it was visited by over 500 000 people, patiently waiting in endless queues.

Every time I looked at these people yearning to see the collection of giant crystals and perceived the admiration that had overwhelmed them after that, I made an account of the deed I had done and my soul was filled with joy that my work and my persistence had not gone in vain!

In the speech that I gave and addressed to the Minister, Mr Alain Savari, during the ceremony for giving me one of the highest French awards for contributing to the field of culture and science (the Comandeur des Palmes Academiques order), I emphasized that for me really

the greatest pleasure and satisfaction remains to see the admiration of the people from all over the world before this unique collection whose magnificence and beauty instills into every man the feeling of reverence to the perfection of nature and love for its grandiose and inimitable creations, and for the future generations it provides an opportunity to reveal the secrets recorded in the hearts of the crystals.

Fig. 30. The author Ilia Deleff among giant quartz crystals during the opening ceremony of the Paris Museum in 1983.

THE COLLECTIONS OF PHENOMENAL GIANT CRYSTALS AND THEIR FATE

THE TRIUMPH OF GIANT CRYSTALS IN PARIS

The exhibition of giant crystals in the National Museum of Natural History in Paris was initially organized in a large building adjacent to the Gallery of Mineralogy.

Three months were necessary for the arrangement and appropriate exhibiting of the samples from the collection – with the united efforts of many specialists, architects and different masters of applied art and decoration. There were also many students who helped as volunteers. Different industrial enterprises and institutes readily collaborated with materials and finances. Sponsors appeared too, and large amounts of money were spent for arranging the exhibits in an esthetic style corresponding to their beauty. The citizens of Paris showed their sophisticated taste and their respect towards art and perfection here too, without sparing any material means for reaching the target set.

Many newspapers and magazines started to report about the exhibition, and people looked forward impatiently to its opening. The interest to the collection was so great that even some ministers came to see it without being able to wait until its opening that took place on 23 March, 1983. Paris celebrated the event and covered it extensively. The whole press, the radio, the television, made a large information campaign. Everywhere people talked and wrote about the collection exhibited in the National Museum of Natural History, showing fantastic crystals, each one of them weighing tons, of incredible beauty and grandeur (Fig. 30-41). Many people from different parts of the world came to see and film these unique exhibits. Mineralogists tried to underline the scientific value of the collection in connection with the special crystallogenesis of giant crystals (De Latil, 1983, Escalier des Orres, 1983; *Exposition...,* 1983; Haccard, 1987; Schubnel, 1987; Deleff, 1995). Many of them had until that time ignored and denied the existence of such large crystals but now both specialists and ordinary people, standing before these rare phenomena, remained captured by their size and grandeur. And the children – they rushed, as if under a spell, from one to another crystal, caressing them and trying to embrace them! The French television showed the official opening of the exhibition and invited me to give a special interview.

➲ Fig. 31. A group of giant quartz crystals – smoky quartz to morion, exhibited in the way it was found in the state of Minas Gerais; the Deleff Collection – Giant Crystals, National Museum of Natural History, Paris.

Fig. 32-34. A general view of the exhibition of the Deleff Collection – Giant Crystals; National Museum of Natural History, Paris.

During the ceremonial opening of the exhibition in France, followed by a cocktail party, I invited the Bulgarian Minister Plenipotentiary in Paris and the embassy people to come and see the contribution of their compatriot Ilia Deleff to world culture. As I already mentioned, at the opening of the exhibition one of France's highest awards was given to me by the French government, for a contribution in the field of culture. Fortunately, this event coincided with the presence in Paris of a large delegation from the Bulgarian Academy of Sciences whose members also attended the opening of the exhibition. At the cocktail party they all wished to speak with me and to congratulate me on the great success. Questions and congratulations rained on me. Everyone wanted to know more about how I found these phenomenal crystals and how I managed to bring them to Paris.

It was from then on that my association and friendly relations with high-ranking officials in Sofia and diplomats in Paris started. The Paris exhibition intrigued and moved some Bulgarian representatives and they started to ask me often whether I could not possibly make such an exhibition in Sofia. My talks on this subject with Bulgarian diplomatic representatives became even more frequent.

Thus, gradually my long-time idea was brought back to life in me once again: to make a donation to Bulgaria in the form of one of my collections. But I was waiting for an appropriate moment. I continued my contacts with the Bulgarian Minister Plenipotentiary in Paris, and I also established contacts with the Ministry of Culture in Sofia. Meanwhile, in 1983 I gave a prehistoric musical instrument to "Ljudmila Zhivkova" Foundation as a present.

In all my conversations and meetings with diplomats or other representatives of Bulgaria, I felt I was respected and the attitude towards me was good. This made me feel even more predisposed and increased my desire to speed up my decision to make a donation to Bulgaria. In 1984 I started a correspondence with the then Minister of Culture Mr Georgi Jordanov, with whom we discussed all the details of the donation of two of my collections of giant crystals, 93 pieces of samples in all.

These two collections, containing inimitable creations of nature, have a high scientific value for mineralogy because they display a richness of varieties and types of crystals from the quartz family. Of special interest and significance are their crystallography and genesis.

Fig. 35-36. A general view of the exhibition of the Deleff Collection – Giant Crystals; National Museum of Natural History, Paris.

Fig. 37-38. A general view of the exhibition of the Deleff Collection – Giant Crystals; National Museum of Natural History, Paris.

❮ Fig. 39. A group of giant smoky quartz crystals and five unique amazonite crystals from the exhibition of the Deleff Collection – Giant Crystals; National Museum of Natural History, Paris.

➲ Fig. 40. An aggregate of mica – muscovite ("flower"), **220 kg**; National Museum of Natural History, Paris.

The main demand I raised before the Minister was for an appropriate building to be provided, where these collections of mine could be placed and shown in a most esthetic and attractive way. I insisted on it that the building and the arrangement of the exhibits should entirely correspond to the significance and importance of these unique collections. The answer of the Minister was positive and confirmed the implementation of my desire – the foundation of a museum of natural history that had to turn into a temple of culture for the future Bulgarian generations.

Shortly after that the "Earth and Man" National Museum in Sofia was founded. In the course of the following years it established itself as a real museum and cultural centre.

Until that moment I was still very concerned about the future of my collections and the realization of my dear wish. My wife, who had been the witness to all my excitement and suffering, was the first person who instilled confidence in me that I was doing the right thing, by saying to me: "I am very glad that you did a great deed, finding the ideal place for your issue – your country, where it will be highly esteemed and will serve for the education and culture not only of your compatriots but also of all the visitors from abroad. Thus you will have spiritual calm and confidence that you did something very good for your country." The gratitude of my compatriots has indeed been great and has been expressed in various ways – awards, publications, popularization in the mass media, many letters that I recieved from acquaintances and from people unknown to me, showing and expressing their great joy and gratitude for my patriotic deed.

I had many motives to make the donation but the major one was my patriotic feeling and the noble ambition to glorify Bulgaria's name all over the world, after having supplied earlier many world museums with rare and valuable exhibits from the earth's mineral treasures.

At last I felt really satisfied.

➲ Fig. 41. Unique quartz crystals from the Deleff Collection – Giant Crystals; National Museum of Natural History, Paris.

➲ Fig. 42. The “Earth and Man” National Museum in Sofia (photo by V. Alexeev).

FOUNDATION OF THE "EARTH AND MAN" NATIONAL MUSEUM IN SOFIA

Thanks to the donation of my collections, the foundation of the "Earth and Man" National Museum in Sofia was materialized. It was opened on 19 June, 1987. Here I am tempted to quote some passages from the article published on the occasion in the *Narodna kultura* newspaper from 26 June of the same year, under the heading “This house of harmony”. It reads: “You have a collection. The beginning of a collection that a Bulgarian, Ilia Deleff – may his name be remembered (!), from distant Brazil, gives as a present to his people”.

The then Minister of culture Mr Georgi Jordanov, in his speech during the opening of the Museum said: “It is from now on that the "Earth and Man" National Museum in Sofia will make history … But it is my duty to open some pages of its remarkable beginning. Several years ago our compatriot Ilia Deleff made a present through the Thirteen Centuries Bulgaria Fund – a collection of about 50 rare natural crystals of giant sizes, collected and preserved by him with anxiety and love in the course of a quarter of a century. A little earlier he had already given another 43 crystals to “Ljudmila Zhivkova” International Foundation. With this gesture of a good son to his country, Deleff personified his dream to plant the root of a unique medium for spreading knowledge on the Earth. This is a moving example of the vitality and nobleness of generosity”.

Shortly after the opening of the Museum it turned into one of the landmarks of the capital Sofia (Fig. 42-48). This is evidenced also by the numerous opinions given by specialists and ordinary people, different in age and nationality, covered in the museum’s book for impressions or reaching me directly or indirectly. It was a pleasure for me to learn from Professor Dr Henri-Jean Schubnel – then director of the Paris Museum of Mineralogy, that a prominent Moscow mineralogist, during a meeting with him in Paris had expressed his deep admiration and his surprise that in such a small country like Bulgaria he could see such an interesting, prestigious and unique collection of giant crystals. Indeed, Bulgaria is a small country but it has a long and ancient history during which remarkable achievements were made.

➲ Fig. 43. A quartz crystal (**1 600 kg**); the Deleff Collection – Giant Crystals, the “Earth and Man” National Museum in Sofia.

Fig. 44. The central Hall of giant crystals in the "Earth and Man" National Museum in Sofia (photo by R. I. Kostov).

Two years after the opening of the "Earth and Man" National Museum in Sofia I decided to put forward to the Ministry of Culture a new plan for the replenishment and enrichment of the collections of the museum. My idea was received in a positive way, as it concerned new collections of samples of extremely high quality, rarity and enormous value. Again I made a donation of two thirds of the value of the new collections that three lorries, full to the top, brought to Sofia in the autumn of 1988. Thus, the "Earth and Man" National Museum became the owner of one of the fullest and richest collections of mineral varieties of the group of quartz in the world, as well as of other rare mineral species. This truth has been categorically corroborated. Bulgaria can take pride in this museum whose exhibits are eternal and will serve for the education of the people. These mineral phenomena are of significance not only with respect to their scientific value; they develop the esthetic feelings of the people and arouse respect towards the perfection of natural creations. Among the unique samples are a spinel crystal from Madagscar with a 30 cm height and a giant cprundum crystal from India (35 kg) with a height of 65 cm. No doubt, the influence that the

Fig. 45. A group of black quartz crystals (morion) (**1 500 kg**) from Conseilheiro Pena, the state of Minas Gerais; the Deleff Collection, the "Earth and Man" National Museum in Sofia.

Fig. 46. Giant quartz crystals of the Deleff Collection, (from **230 to 280 kg**); the "Earth and Man" National Museum, Sofia (photo by V. Alexeev).

❨ Fig. 47. A giant quartz crystal as a “hero” from a film with a fairy-tale plot, with the participation of the Brazilian TV-star Shusha; the Deleff Collection in the “Earth and Man” National Museum, Sofia.

➲ Fig. 48. An “icosahedron” crystal sculpture in front of the “Earth and Man” National Museum, Sofia (photo by R. I. Kostov).

inimitable creations of nature have on people is many-sided and they are attracted over and over again to visit the museum, to enjoy and admire it.

One of the valuable crystal samples which went with my latest donation was a group of white and transparent quartz – a twin crystal weighing 140 kg with the shape of the Latin letter V. This group was the main "hero" in a film with a fantastic, fairy-tale plot that won a prize in Rio de Janeiro and the press wrote a lot about it (Fig. 47). In the film, the crystal was represented as a source of energy through which it does wonders. And perhaps one day science will prove that this was not only fiction?

OTHER COLLECTIONS OF MINE IN BULGARIA

In 1996, after a long absence, I visited Bulgaria again. During this visit I established many contacts with colleagues – mineralogists, specialists, researchers and prominent scientists.

I was invited by Professor Dr Kiriak Kovachev, Rector of "St. Ivan Rilski" University of Mining and Geology in Sofia, to give a lecture before the professors, specialists and the students of the university. This meeting was very successful and left many pleasant impressions in me.

Shortly after returning home, I made a decision to make a donation for the museum at the university – a collection of mine of natural minerals, originating from Brazilian deposits, various in genesis and location.

In the following year, 1997, on the basis of a decision made by the Academic Council of "St. Ivan Rilski" University of Mining and Geology I was given the honorary title Doctor Honoris Causa, awarded to me for exceptional merit for the preservation of the mineral richness of the planet. Before the official ceremony of awarding the title I had the pleasure to present personally my donation to the university Museum of Mineralogy, Petrography and Mineral Resources.

The basic part of the donated collection contains different varieties of quartz, among which there is one amethyst geode, exceptional in the intensity of its colouring and the perfection of crystals, weighing 83 kilograms, an aggregate of rock crystal weighing 50 kilograms, as well as a special collection of almost 100 samples of rock crystal with perfect and rare crystal shapes that constitute a large scientific interest (Kostov, 2000). Apart from quartz

crystals, the collection also included sapphires, jewelry topaz, multicoloured tourmaline, mica and other rare minerals (Fig. 49).

I am glad and happy that this collection of mine, having a large scientific value, can serve as an object of research for the specialists and the students. Recently, a publication of mine appeared, co-authored, dealing with quartz pseudocrystal epimorphs from Brazil, very interesting with their shapes, that were also included in the donation for the museum (Deleff, Kostov, 1997).

In the course of time my contacts with this university in Sofia developed further and deepened. Thus in 2003, in connection with the 50th anniversary of the foundation of the University, I decided to make a second donation for its mineralogical museum. The focus in this donation is a giant beryl crystal weighing 200 kilograms. Apart from it, this collection includes about 100 mineral samples from Brazil, smaller in size, among which quartz (rock crystal, amethyst and pink quartz), gem topaz, gem beryl, tourmaline and rarer or morphologically interesting minerals such as albite (cleavelandite), kyanite, fluorite and childrenite, as well as many small precious minerals that will be used in university classes in gemology.

➲ Fig. 49. Blue corundum, tourmaline, topaz, mica and other minerals, part of the Deleff Collection in the Museum of Mineralogy, Petrography and Mineral Resources, "St. Ivan Rilski" University of Mining and Geology, Sofia (photo by R. I. Kostov).

Bulgaria also possesses another of my mineralogical collections, smallish but very attractive, mainly consisting of varieties of quartz crystals that I gave as a donation in 2001 to Nikola Manev's Museum House in the town of Chirpan. The artist Mr Nikola Manev, who was born in this town, is a remarkable Bulgarian living and working for a long time in Paris who contributed to his country's fame through his remarkable pictures. The collection includes mainly samples of rock crystal and parts of amethyst geodes (Fig. 50-51).

I am happy for the fact that in this museum, although small, the inimitable crystal masterpieces of nature are present in full harmony with the marvellous creations of Man's hand, and the esthetic impact of this combination brings joy and admiration to everyone who has come to observe them.

Fig. 50-51. Rock crystal and smoky quartz crystals from Nikola Manev's Art Museum in Chirpan (photo by R. I. Kostov).

COLLECTIONS IN OTHER CITIES AROUND THE WORLD

As I mentioned earlier, during the many years of travelling around the different mines in Brazil, especially in the state of Minas Gerais, I became rather popular among the miners as a man who stopped at nothing in his desire to acquire all kinds of mineral samples, without any consideration of their price. Thus gradually the miners themselves started coming to me to offer me everything interesting that they found, and thus, in the course of time, I managed to gather together a large quantity of crystals, exceeding 400 tons. "Giants" among these were approximately 200 pieces, the crystals of average size were numerous, and the smallest ones were in great supply. Many crystals resembled each other in their qualities and dimensions. My fund of mineral samples, rich in the variety and uniqueness of the crystals, became so full and large that it allowed me to make three of four large collections. At first I made two sets of collections, each of them having several *vedeti*, i.e. several extremely interesting individuals.

In the collection that I set aside for the Paris Museum many monumental crystals were included that cause amazement and reverence for nature – with their giant size and grandeur.

The exhibition of my collection in the Paris Museum aroused a great interest towards giant crystals among other museums in Europe. I received letters from many countries asking me whether I could supply their museums with such giant crystals, the possession of which had meanwhile turned into a fashion.

One day Mr Hubert Bari, manager of the Mineralogical Museum in Strasbourg, came to me. He said he wanted to purchase a collection of giant crystals for their museum, but he did not conceal the fact that their finances were scanty and suggested to me, if I accepted to help them by supplying them with one such collection, but on credit for two years. After long and detailed talks, and only after I was convinced in his sincere intentions and his great desire, did I decide to help them and accepted the conditions offered to me for the credit. I supplied the museum with 30 giant

crystals, among which an amethyst geode weighing 2 tons, resembling an ancient ship, and of very high quality. Mr Bari organized a very modern exhibition in Strasbourg that had a great success and attracted the attention not only of the French press but also of the European one.

During the time of my activities I never stopped taking an interest in everything remarkable and valuable among the representatives of the world of stones and never stopped collecting these. Thus in the recent years I managed to enrich my fund with exceptionally beautiful and very valuable crystals. For this reason I initiated the formation of a fourth collection of "giants" that I reckoned it should go to the town of Borculo in the Netherlands. A young and industrious Dutchman, Mr Benjamin de Wit, manager of a small museum in this town, had visited the exhibitions with my collections in Paris and in Sofia. Very enthusiastic, delighted, he had a meeting with me and expressed a strong desire to buy off my fourth collection, but with a request for longer credit terms. The good conditions that he offered to me, as well as some other favourable circumstances enabled the conclusion of this contract. Thanks to my collection, Mr de Wit managed to purchase, also on credit, the old mayor's building in the town as well and to turn it into a modern and prestigious museum, an interesting sight for every tourist visiting the town of Borculo, which is a tourist place in the Netherlands. I feel happy that, thanks to my will and my desire to create yet another cultural centre, all the visitors of the museum in this town have the opportunity to admire the spectacular breath-taking giant crystals.

MY PRIVATE COLLECTION

A good collector gathers, enriches and improves his collection for the whole of his life. This is so especially in mineralogy because permanently new minerals and precious stones are being found, and every time new and more interesting and more beautiful samples appear.

It was since 1957 that I had started to dream of making up a prestigious collection but this dream of mine was gradually realized later, in the course of several decades. At the very beginning I could not afford to keep everything interesting that came into my hands. I had to sell samples that I cried for when I had to part with them! I had to make my living! Still, in those thirty-six years an enormous number of mineral samples passed through my hands and, whenever I had the opportunity to afford this, I put aside everything that I considered very interesting, rare and beautiful.

With the passage of time, and imperceptibly for me, my personal collection became huge. During the last ten years I had the chance to acquire mineral samples with exceptional qualities – unseen so far for their rareness and beauty. They all cost a lot to me but I am very glad and even happy that I can possess them as they are an example of the ideal qualities of the crystals of the mineral kingdom.

This collection, gathered for the longest time, is the latest in my life. It consists of eighty pieces of exceptionally rare crystals, of extremely high quality, that I kept passionately and with much love, as I could not imagine that I could ever part with them. I had the opportunity to prepare and adjust them precisely for what I dreamed and imagined for a long time.

My idea is for something grandiose in the stone world to be built up that could be called the "Pantheon of Mega-Quartz Crystals" (Fig. 52-55).

I imagine these magic crystals gathered in one place, monumentally and esthetically exhibited, suggesting the idea of a real pantheon where the remains of eminent personalities are kept, or a temple of mythological gods. Thus we, the people, will pay respect to and glorify these perfect mineral phenomena that mother Nature created and offered to us, so that we can admire them forever.

➲ Fig. 52. A giant quartz crystal – smoky to morion ("window") with gas-liquid inclusions (**290 kg**); Conseilheiro Pena, the state of Minas Gerais; the Deleff Collection.

One of the giants of this collection is a quartz crystal – morion, the most expensive stone of dark fiery colour, ideal for polishing. This large stone could yield 180 000 carats of gem stones. There are also other quartz crystals, white, transparent and pure like gold, others are large and shaped like gothic churches. Amethyst geodes have very beautiful shapes and colours. Especially interesting is one very large geode of gypsum crystals, transparent and pure like the water of a mountain stream and very fine and beautiful (Fig. 56). The collection also contains many other large samples of precious minerals – aquamarine, precious topaz, different green and red tourmalines, spodumene, rutile and many other minerals, drawn from pegmatite deposits in Brazil.

This personal collection of mine is different from any other I have ever made, for the fact that it was gathered for a long time and I invested in it great interest and a lot of skill. To possess these fairy-tale crystals, I spent a lot of money and time and did a lot of work, gathering them without rest and with a great desire for the enrichment of my favourite collection that really gives me happy moments of joy, pleasure and deep satisfaction. I must admit that the creation of this collection took almost half of my lifetime, because of which there are certain profound feelings relating me to it. Its natural beauty as well as its scientific and material value are of a very high level indeed.

A typical feature of mine is to dream of something and to try persistently to make it happen – even when achieving the dream appears to be something impossible. I managed to realize some of my dreams, thanks to serious and constant work, stimulated by my strong belief in the future success.

As a young man I dreamed of reaching the fairy-tale Amazonia. I managed to realize this dream. Then I started dreaming of making a large fantastic collection of unique giant crystals. Fortunately, this dream, too, came true. But I continue to dream... My ideas and my piety to the beauty of the mineral world open up new vistas for my imagination.

In my professional activities, I managed to master the art of praparing mineral samples, i.e. their processing and shaping in a most refined and esthetic manner, so that they should be interesting and attractive while being shown in exhibitions. However, as I always strove to think up something new and sufficiently worthy – such that it should underline the beauty of my

➲ Fig. 53. A monumental quartz crystal – a morion, **92 kg** (part of the Deleff Collection in his home in Rio de Janeiro).

Fig. 54. A collection of rock crystals ("A Megacrystal Quartz Pantheon") in the home of the author Ilia Deleff in Rio de Janeiro.

Fig. 55. A giant cluster with transparent rock crystals (**300 kg**) from the Corinto mine, the state of Minas Gerais; the Deleff Collection.

favourites, I conceived the idea to make a planetarium in which the planets would be spheres made of natural mineral matter – precious and decorative minerals!

I had visited different planetariums where the stars in space were represented through light images. And my idea was to present a model of the Solar system made by minerals. I found the necessary literature in astronomy as well as the information on the planets of the Solar system that had been obtained by the Voyager II probe, and I started studying the characteristics of the separate planets. Naturally, more knowledge was necessary for me to be able to realize my project in a perfect fashion. After this preparation, I took upon myself the very heavy task of finding the corresponding minerals, the raw materials meeting the requirments for size and colour. I found the only person in Brazil who could make, through special processing and polishing, these colossal spheres, nine in number.

Each sphere (Fig. 57-58) represents one planet of the Solar system and corresponds in colour and size to the particular planet. For example, the Jupiter sphere weighs 1 500 kilograms. It has different colours, long stripes, spots and other features that provide an ideal image of the

❍ Fig. 56. A group of transparent gypsum crystals (**25 kg**) from Iraí in the state of Rio Grande do Sul; the Deleff Colelction.

➲ Fig. 57. A general view of the "Megacrystal Quartz Pantheon" (in the foreground with processed giant spheres of decorative dolomite) from the private collection of the author in his home in Rio de Janeiro.

real planet. Its size and beauty arouse amazement. It would be best for all these spheres to be installed in a round room, corresponding in size, with a spherical vault. Each sphere would be placed on a mechanical axis that would rotate.

The position of the spheres would correspond to the actual position of the planets in the Solar system. There will be a special illumination directed to the spheres, and the spheres will be installed high in the planetarium, so that the relative distances between them would be in agreement in the necessary proportions, especially with respect to the Sun. The colours of the spheres are: blue, marine blue, brown, greyish, yellow, lilac-red, etc., depending on the colour of the decorative precious stone of which the separate sphere is made.

My idea is for these nine spheres, the planets of the Solar system, to be installed in a darkened room, discreetly lit, and for each one of these to revolve with a slow motion around its axis, showing its beautiful colours and the shining of its rings. This could be a fantastic cosmic show where the spectators "will feel high in space and very close to the planets!" In its originality, this will indeed be the unique planetarium of the world!

➲ Fig. 58. A processed giant sphere of decorative dolomite (**1 500 kg**), the state of Minas Gerais; the Deleff Collection.

Fig. 59. A unique group of pink tourmaline (rubellite) and quartz with a height of 110 cm from the Itatiaia mine, Conseilheiro Pena, the state of Minas Gerais (photo by A. Barbosa).

THE MINERAL TREASURES OF BRAZIL*

* This section was written in collaboration with Assoc. Prof. Dr Ruslan I. Kostov

AN OUTLINE OF THE MINERAL RESOURCES OF BRAZIL

Brazil is situated on the ancient Precambrian foundation building up the South American platform. Three shields are represented on it, Guinean, Central Brazilian (Western Brazilian) and Eastern Brazilian. In this foundation, various metamorphic rocks are represented, as well as igneous rocks intruded into them. Located on it is a mighty sediment complex in which the oldest rocks, represented by conglomerates and sandstones of the Roraima series, are of the Proterozoic Era. A meridional zone of depressions divides the Western Brazilian from the Eastern Brazilian shield. In the base of the latter, the Minas iron-ore series is located, represented by rich iron ores, called itabirites (an internationally recognized designation of jaspilites) – after the name of the town of Itabira. At the borderline between Precambrian and Cambrian time within the limits of the Eastern Brazilian system, granitoid intrusions formed as well as pegmatites associated with them, rich in precious minerals (Fig. 59-60) and rare metals (beryllium, tantalum, niobium). Developed in some grabens are also sediment complexes, up to 4 000 m strong, of a younger age. During the Jurassic and the Early Cretaceous Period, basalts flowed within the trapps of Paraná, and different intrusive rocks formed.

Brazil leads the world list in the extraction of a large number of ores and minerals, among which iron and manganese ores can be mentioned, beryllium and niobium-tantalum bearing minerals (Fig. 61-62), as well as quartz for piezoindustry. Rich are Brazil's deposits of bauxites and industrial minerals like kyanite, apatite (phosphorite), graphite, chrysotile asbestos, talc, kaolinite, fluorite and barite. Zircon, monacite, ilmenite and rutile are mined from coastal zones and alluvial placers in the states of Bahia, Minas Gerais, Goias and Mato Grosso. Registered on the territory of the country are different genetic deposits of uranium, tungsten, tin, gold, lead-zinc, nickel and copper ores. Known are some deposits of energy raw materials such as oil, natural gas and coal, but of greatest significance are bituminous schists. Among pegmatites, apart from quartz, feldspar and mica as a raw material for different industrial purposes, various

⊂ Fig. 60. Extremely rare crystals of pink quartz on rock crystal from the Sapucaia deposit, the state of Minas Gerais; the Deleff Collection.

Fig. 61. A columbite crystal from Minas Gerais sized ~**10x20 cm**; the Deleff Collection.

Fig. 62. A tantalite crystal found around Pedra Alta, the state of Minas Gerais; the Deleff Collection.

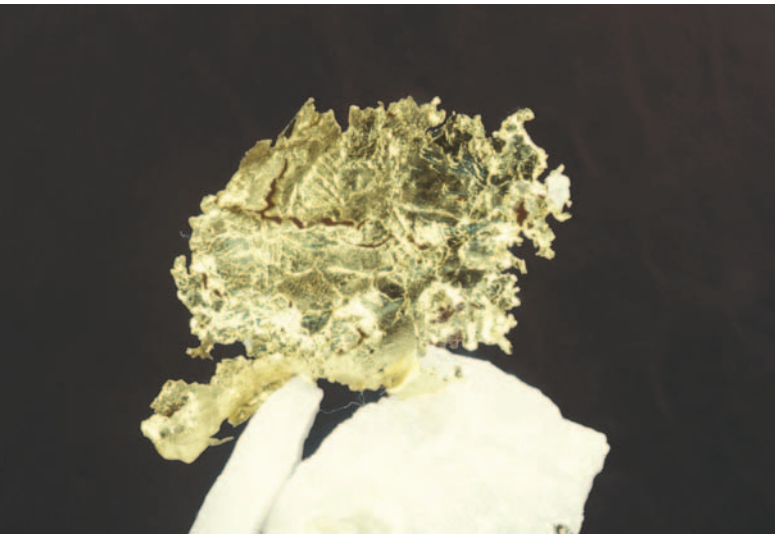


Fig. 63. Leaf-like native gold from the Morro Velho deposit, the state of Minas Gerais.

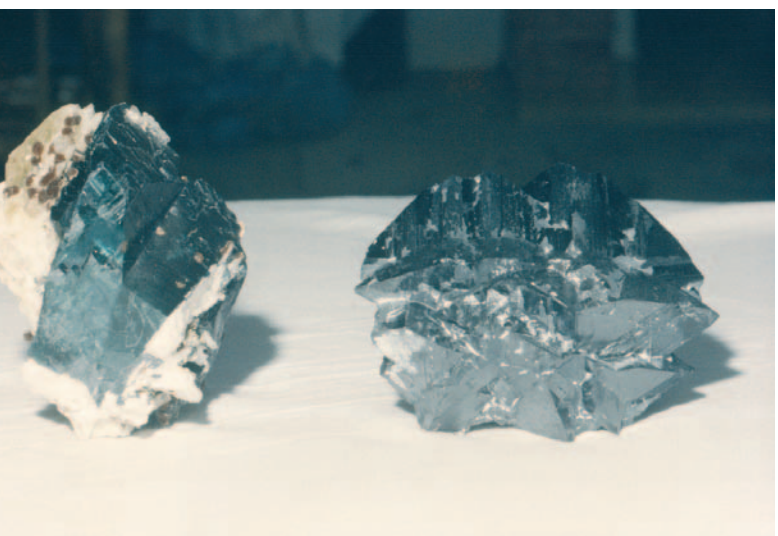


Fig. 64. A cassiterite (**2 kg**); National Museum of Natural History, Paris; the Deleff Collection.

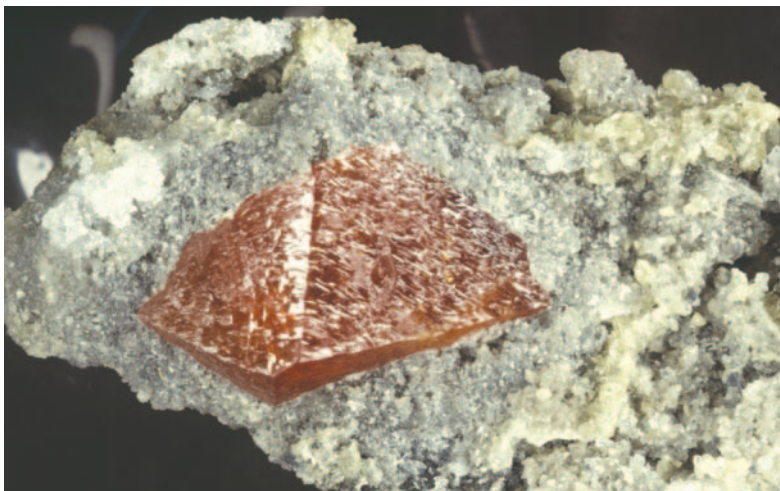


Fig. 65. Scheelite crystal from the Morro Velho deposit, the state of Minas Gerais.

precious minerals are mined: emerald, aquamarine, chrysoberyl, topaz, tourmaline, kunzite and the varieties of quartz. On the territory of the country, diamonds from placer deposits have been known since the XVIII century.

Iron ores, that are mainly represented by hematite are situated in the so-called Quadrilátero Ferrífero of the state of Minas Gerais, with reserves of over 1 billion tons (Franco et al., 1972). Apart from being in the content of itabirites, hematite is also common in the form of fragile sandy rock – "jacutinga". Manganese ores are built up mainly from the mineral pyrolusite, with representative deposits near Serro de Navio in the federal territory of Amapá.

Situated on the territory of Brazil is one of the deepest gold-bearing mines in the world – Morro Velho, in the state of Minas Gerais (3 000 m). It has a history of more than 140 years (Fig. 63). Today it is a modern mechanized mine. The horizontal gold-bearing vein at this depth has a length of 7 500 m. Apart from placer gold, reported in the country are also crystals with octahedral and, more rarely, cubic forms (the Serro do Lenheiro deposit in the state of Minas Gerais).

Of the lead deposits, the one in Serra da Boquira can be pointed out – in the state of Bahia, where anglesite, cerussite and pyromorphite can be found in the oxygenation zone. As a by-product in the lead deposits, silver is also extracted. Large cinnabar crystals, 26 cm in size, have been reported from Antônio Pereira, Ouro Preto in the state of Minas Gerais, and molybdenite with crystals sized up to 14 cm, was found near Serra de Timbaúba, Picuí in the state of Paraíba (Franco et al., 1972). A large cassiterite crystal with a mass of 2 kg is described from Encruzilhada in the state of Rio Grande do Sul, and another large crystal is exhibited in the Deleff Collection in the Paris Museum of Natural History (Fig. 64). Large scheelite crystals of red colour are known from the Morro Velho deposit (Fig. 65).

ORIGIN OF GIANT CRYSTALS

Giant crystals of quartz, feldspar, beryl and other precious minerals in Brazil are related in their genesis mainly to pegmatites. These are macroblock and coarse-grained in texture vein rocks that are genetically related to some intrusive body. Worldwide, most commonly represented are granite pegmatites. They develop both within local granite plutons and in their metamorphic environment. During the intrusion of magma in the upper parts of the Earth's crust, it gradually crystalizes, whereby some intrusive bodies form. Later, after the crystalization of the magma, the residual melt enriched in volatile components penetrates fissures in the host rocks and forms pegmatites. These fill in empty spaces in and out of the plutons. Pegmatite fields may occupy large areas of hundreds of square kilometers. The commonest pegmatitic minerals are feldspars, quartz and muscovite. Despite Si, Al and Ca as main constituent elements, pegmatites are enriched in elements such as Li, Be, B, F, Rb and Cs, as well as in certain cases in rare earth elements – Mo, Zr, Hf, Ta, Nb, Th and U,

Of extreme importance for the formation of giant crystals is the presence of well-differentiated zones in the pegmatites with the formation of large cavities in the central zones, where conditions for growth of giant crystals should be created both from the major rock-forming minerals and from a large number secondary and accessory minerals, many of which also have precious colour varieties.

The Precambrian crystalline shields of South America are enormous stabilized areas, built up of granites, gneisses and schists that fall within the territory of Brazil. In the meridional direction from the north to the south, the major regions of distribution of pegmatite fields can be followed up in these ancient shields – from the state of Ceará (with the regions of Cristais and Cachoeira), the state of Paraíba (Picui), the state of Bahia (Vitorio da Conquista), the state of Minas Gerais (between Governador Valadares and Conseilheiro Pena) to the south up to the surroundings of Sao Paulo in the same state.

In many cases the pegmatites, because of denudation processes and due to the peculiarities of the local climate, are decomposed, whereby many of the rock-forming minerals are strongly

changed (feldspar turns into clayey minerals). Durable and hard minerals (many of which are precious) are accumulated in different eluvial and alluvial depositions, as well as in the soil.

The problem of the dimensions of crystals has been dealt with by scientists, who tried to describe the conditions of their formation (Metz, 1964; Rickwood, 1981). One of the largest crystals is taken to be a beryl from Malakialina in the Malagasy Republic with dimensions of 18 m length and 3.5 m in diameter. It was found in a pegmatite and is assessed in volume at 143 m^3 and a mass of 380 tons. A giant feldspar from the Ural Mountains is reported, in which a whole quarry was opened. Crystals sized 10x10 m and a mass of up to 100 tons have been reported there. A single microcline from the Devils' Hole Mine in Colorado, USA, had a size of 49x36x14 m and a mass of 16 000 tons.

Large quartz crystals were registered in many countries of the world. Among these, a quartz giant from Kazakhstan weighing 70 tons is worth mentioning. But probably the record is held by a quartz crystal from Mancho Felipe, Izapore Goiaz in Brazil, reported to be 6.1 m long, measuring 1.5 m across a prism face and having a calculated mass of some 100 tons (Richwood, 1981).

Large quartz crystals in the Swiss Alps were found in 1917 near Zinggenstock and in 1867 near Tiefengletscher in the Uri canton (with the largest crystal named Grandfather). In the Austrian Alps in 1965, several sizable crystals were found, the largest of which has a 618 kg mass.

Comparatively large quartz crystals are reported from the Farm Otjua 37, Karibib District, Erongo Region in Namibia. In a zonal rare-metal pegmatite about 2 km long, together with jewelry tourmaline in a quartz nucleus, white and smoked quartz can be found. There, in cavities, groups of giant quartz crystals were found, whereby separate individuals were measured with a height of up to 2 m and up to 2 m in diameter. Crystals from this location are exhibited in the Crystal Gallery in Swakopmund and in the Museum of the Geological Survey of Namibia in Windhoek.

PRECIOUS MINERALS

Some of the first descriptions of the gold-bearing and diamond-bearing deposits of Brazil appeared as early as the beginning of the 19th century (Mawe, 1812; Eschwege, 1833). Generalizing data on the precious and decorative minerals of Brazil can be found in some scientific monographs or articles (Calmbach, 1938; Diniz Gonsalves, 1949; Putzer, 1956; Franco et al., 1972; Franco, 1981; Sauer, 1982; Bancroft, 1984; Delaney, 1996). In the granite pegmatites from Minas Gerais, a number of minerals with jewelry qualities are reported, such as tourmaline (Fig. 62), topaz, lepidolite, petalite, spodumene, morganite, amblygonite, pollucite and quartz (Ralls, 1967; Bank, 1970a; Chermette, 1977; Proctor, 1984; 1985; César-Mendes, Gandini, 2000; Pardon, 2001). The state of Minas Gerais contains one of the world's most important pegmatitic fields yielding a lot of superb gem quality minerals.

The precious minerals of Brazil in unprocessed and processed state were depicted in stamps from 1974, 1977 (emerald, topaz and aquamarine), 1989 (tourmaline and amethyst) and 1998 (alexandrite, chrysoberyl and indigolite). For the 31st International Geological Congress that took place in 2000 in Rio de Janeiro, a special philately sheet was issued.

DIAMOND

The first diamond was found in Brazil in 1725, during the washing of river sand in search for gold near Diamantina in the state of Minas Gerais. The extraction of diamonds increased after 1844, when rich diamond-bearing placers were also found in the neighbouring state of Bahia. Today diamonds are found in placers and in host rocks in most of the Brazilian states, but mainly in the states of Mato Grosso (according to some estimates – up to 40-50% of the extraction in separate years), Minas Gerais (up to 20-25% of the extraction in separate years) and Bahia (Draper, 1950; Cassedanne, 1989a; Gonsaga et al., 1994; Karfunkel et al., 1996; Kaminsky et al., 2001). It is assumed that almost 50% of the raw material is of gem quality. Diamonds of highest quality are found in the western part of the state of Minas Gerais (the regions of Bagagem, Coromandel and Diamantina). Most diamonds are small;

diamonds of up to 7-10 carats are rare. The largest diamonds from Brazil, led by the "President Vargas" diamond (726.6 carats) are listed in table 1 (after Reis, 1959; with additions). Morphologically, rounded rhombic dodecahedra and more rarely cuboids and hexatetrahedra prevail. The crystallography of many diamond crystals from Brazilian locations is described in the classical work "Der Diamant" (Fersmann, Goldschmidt, 1911). Nearly 40% of Brazilian crystals are transparent and the rest are matte-white to colourless, bluish, yellow, brown and green. During the 80s, the yearly extraction of diamonds in Brazil was about 250 000 – 300 000 carats. In Brazil the diamond carbonado can be found, representing oval aggregates of irregular shape and admixtures of graphite. The largest individual, the "Carbonado do Sergio" carbonado, found in 1905 near Lençóis in the state of Bahia, had a mass of 3 167 carats.

Table 1. List of some of the largest diamonds found in Brazil

Carats	Name	Colour	Year	Occurrence, State
726.6	Presidente Jetulio Vargas	white	13.08.1938	Santo Antônio River, Coromandel, Minas Gerais
602.0	São Antônio	brown	1993	Santo Antônio River, Minas Gerais
600.0	Goiás	-	1906	Verissimo River, Goiás
455.0	Darcy Vargas	brown	08.06.1939	Santo Antônio River, Coromandel, Minas Gerais
428.0	Scharneca I	-	?	Santo Ignacio River, Coromandel, Minas Gerais
407.68	Presidente Dutra	white	25.07.1949	Doradinho River, Coromandel, Minas Gerais
400.65	Coromandel IV	white	14.01.1940	Santo Antônio River, Coromandel, Minas Gerais
375.1	Diário de Minas Gerais	-	1941	Santo Antônio River, Minas Gerais
375.0	Vitória I	-	1945	Abaeté River, Tiros, Minas Gerais
354.0	Tiros I	brown	1938	Abaeté River, Minas Gerais
346.2	Bonito I	white	1948	Santo Antônio River, Coromandel, Minas Gerais
328.34	Vitória II	white	1943	Abaeté River, Tiros, Minas Gerais
324.0	Patos	brown	31.10.1937	São Benito River, Minas Gerais
261.88	Estrêla do Sul	white	1853	Bagagem River, Minas Gerais
261.0	Cruzeiro (Vitória)	white	1942	Santo Antônio River, Coromandel, Minas Gerais
245.0	Carmo do Paranaíba	brown	1937	Bebedouro River, Minas Gerais
238.0	Abaeté	pink	1926	Abaeté River, Minas Gerais
227.0	Mato Grosso	red	1963	Mato Grosso
198.0	Tiros II	pink	1936	Abaeté River, Tiros, Minas Gerais
176.2	Brasília	blue	01.1944	Abadia do Dourados, Coromandel, Minas Gerais
174.5	Juscelino Kubitschek	-	1954	Estrela do Sul, Minas Gerais

➲ Fig. 66. Sapphire from the state of Mato Grosso, separated in a plane perpendicular to the *c*-axis, with many "phantom" zones of growth; the Deleff Collection.

The basic source of diamonds are river-bed and terrace placers of the contemporary river network and more rarely ancient alluvial placers or conglomerates. Brazilian geologists describe the so-called diamond-bearing phyllites as the basic source of diamonds in the country. These represent considerably changed schistous rocks of white, greyish and pink colour, split by multitudinous quartz veinlets. At places the "phyllites" have a layer structure and are enriched in separate places in hematitic, manganese-containing and, more rarely, phosphoritic concretions. These rocks are regarded as changed initial basic effusive rocks. To the southeast from Coromandel, the first diamond-bearing kimberlite pipe Vargem in Brazil is reported (Svisero et al., 1977), followed by findings of other kimberlite pipes and dykes.

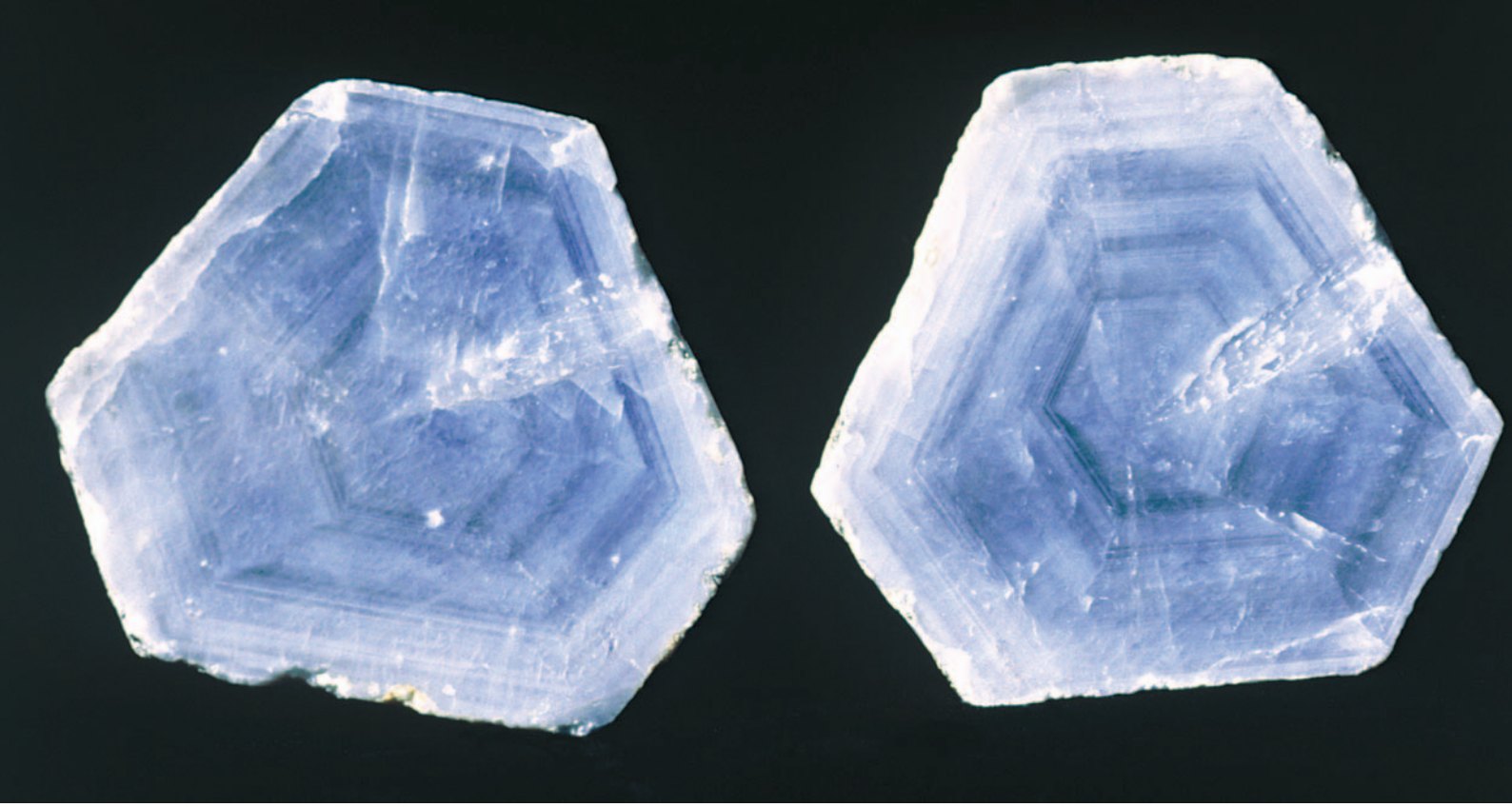
The diamonds in the western part of the state of Minas Gerais from alluvial and colluvial sediments are of glacial origin, brought by the São Francisco craton and are related to the 700-450-million-year ancient Brasilia orogenic belt. In the region, conglomerates and ultrabasic alkaline rocks are found, and in their petrographic composition the rocks described as kimberlites are regarded as similar to kamafugites (Gonzaga et al., 1994). After a diamond from kimberlites was found in the state of Mato Grosso – 20 km from the town of Julina, the estimated extraction is of 300 000 carats per year (Koivula, 1987a).

Investigated were about 1 000 diamonds from the basins of Rio São Francisco and Rio Paranaíba in the Coromandel area, Minas Gerais (Kaminsky et al., 2001). Their morphology is primarily distinguished by the rounded rhombic dodecahedra, brown pigmentation spots and traces of mechanic erosion. In diamond crystals, olivine, enstatite, pyrope, chrome-spinel and sulfides are registered as major mineral inclusions, corresponding to kimberlite magma from a 150-200 km depth source.

The reason for the colouring of some green and brown diamonds from southeastern Brazil (Espinhaco Range in Minas Gerais) is associated with both radiation centres and diffusion of admixture elements in the external parts (Chaves et al., 2001).

RUBY AND SAPPHIRE

Ruby is known from the region of Rio Gurupi in the state of Pará (Franco et al., 1972), and also in the state of Bahia.



The Indaia deposits of sapphire in the state of Minas Gerais are situated about 30 km southeast from the town of Ipatinga – the dimensions of the crystals are 0.5-2 carats at the average, and their colour is usually violet or purple (César-Mendes et al., 1994; Epstein et al., 1994). Sapphire is extracted mainly from alluvial placers along the Pedrosa Creek and the Macuco Creek.

In 1979 in the state of Mato Grosso near the Andes, a deposit of blue corundum (sapphire) was found, with hundreds of kilograms of crystals, but with no jewelry quality. I had the opportunity to inspect this large amount of blue corundum and I found 12 pieces of large crystals containing in their inner part hexagonal "phantoms" from zones of growth, many of which I keep in my private collection (Fig. 66).

EMERALD, AQUAMARINE AND OTHER BERYLS

EMERALD

Early reports on emeralds from Brazil go back to the XVI century (review in Sinkankas, 1981). The deposits and the chemical peculiarities of emeralds are described from different Brazilian regions and states, but mainly in Bahia (Carnaiba, Salininha – in the Campo Formoso district), Goias (Serra das Lages or Itaberai; Sarandy) and Minas Gerais (Nova Era region – Capoeirana, Pitieras, Belmont) (Da Cunha, 1961; Draper, 1963; Bastos, 1965; Pough, 1968a; Almeida Rolff,

1970; Cotton, 1970; Barbosa, 1973; Sinkankas, 1981; Cassedanne, Sauer, 1984; Cassedanne, Barros, 1986; Hanni et al., 1987; Souza et al., 1987; César-Mendes et al., 1989; 1992; 2002a; 2003; Schwarz, Hanni, 1988; Epstein, 1989b; Giuliani et al., 1990; Schwarz, 1990; Schwarz et al., 1990; Souza, 1990; Sauer, 1992; Putz et al., 1998a; 1998b). As of 1969, the Carnaiba emerald "rush" has been involved by about 6 000 garimpeiros and camp followers (Sinkankas, 1981). Emerald occurrences of less importance are also known near Ferros and Teófilo Otoni in the state of Minas Gerais (Almeida Rolff, 1968) and Bom Jesus dos Meiras in the Brumado district in the state of Bahia (Seidel, 1914; Just, 1926). Emeralds in Brazil are mainly related to two different genetic types – in metamorphic rocks (mica schists and in cases – in dolomitic marbles) and in pegmatites. In my collection I have about ten rare and beautiful emerald aggregates from these mines.

Thus, for example, from the Socoto deposit in the state of Bahia, 25 km to the northeast of Campo Fornoso, emeralds for up to 1 million dollars yearly were extracted (data for 1984). The host rocks are granite pegmatites, embedded in serpentinized ultrabasic rocks. Recently emeralds have also been found in Pirenópolis, Goias State (Da Brum et al., 2002). The emeralds at the Capoeirana farm and at the nearby Belmont mine near Nova Era in the State of Minas Gerais are found in quartz veins cutting ultramafic biotite schists (César-Mendes, 2000).

AQUAMARINE

The most famous mines for aquamarine in Brazil are those near Espírito Santo, Marta Rochia (after the name of beauty queen Miss Brazil 1954), Fortaleza and Marambaia in the state of Minas Gerais (Bastos, 1964; Almeida Rolff, 1968; Pough, 1968b; Sinkankas, 1981; Proctor, 1984; Cassedanne, Alves, 1991b; César-Mendes et al., 2001; Pardon, 2001). In the latter mine in 1910, one of the largest aquamarines in Brazil was found – a zonally coloured crystal with a mass of 110.5 kg (sized 50 cm in height and 40 cm in width) with an external green zone, a middle yellow-green part and a central blue part. In the Marta Rochia deposit, a crystal weighing 34 kg was found, given the same name, and again from that place is probably the largest processed aquamarine (kept in a bank safe), cut off from a 24-kg crystal named Dom Pedro. Aquamarine with a mass of 22 kg and a 90% jewelry volume of the crystal is known from the

mine Taquara (Miglios), northeast of Teófilo Otoni (together with Marambaia, Catugi). Another crystal with a mass of 23.3 kg is owned by the Brazilian government.

In 1979, a slightly perished large aquamarine crystal sized 59 cm in height and 38 cm in width and a mass of 19 kg was found near Jaqueto in the municipality of Miraja in the state of Bahia (Sinkankas, 1981). Nice aquamarine crystals sized up to 15 cm in diameter, are known from Virgem da Lapa near Aracuai in the state of Minas Gerais.

Aquamarine is also known from the state of Rio Grande do Norte (São Tomé, Acarí, Lages Pintadas), the state of Paraíba (Seridó, Pedra Lavada, São Mamede), the state of Piauí, the state of Bahia (from Rio Pardo, Itambré) and Rio de Janeiro (Itabapoana). Among the various nuances of aquamarines, especially rare are the deep blue individuals, but these rarely exceed 2 carats. Such individuals are known from the well-known Santa Maria de Itabira mine in the state of Minas Gerais. The dark blue colour of aquamarine is due to relatively low Fe^{3+} content in octahedral positions in the structure and the greenish hue – to a higher Fe^{3+} and a lower Fe^{2+} content (Viana et al., 2002).

The famous Brazilian lapidary of precious stones Manoel Bento dos Santos bought on credit in 1971 at the stock exchange in the town of Governador Valadares a large beryl crystal weighing 116 kg at a high price, supposing that its internal part would be suitable for processing. Later, in detailed investigations, it turned out that the crystal did not live up to the expectations and Mr Manoel's distress at this loss was great. To pay back part of the credit during the purchase, Mr Manoel was forced to sell a processed emerald with an exceptional colour that he had shown at the exhibition and had received the first award for it.

Brazil is also famous for the "type" Maxixe deposit in the Piaui valley in the state of Minas Gerais of the so-called maxixe beryl (usually corroded crystals with strong reverse to the normal pattern dichroism) that is blue but loses its colour in exposure to sunlight (Sinkankas, 1981; Nassau, 1996). Other gem beryl varieties include pale green, grass-green beryl and yellow (golden) beryl crystals.

MORGANITE

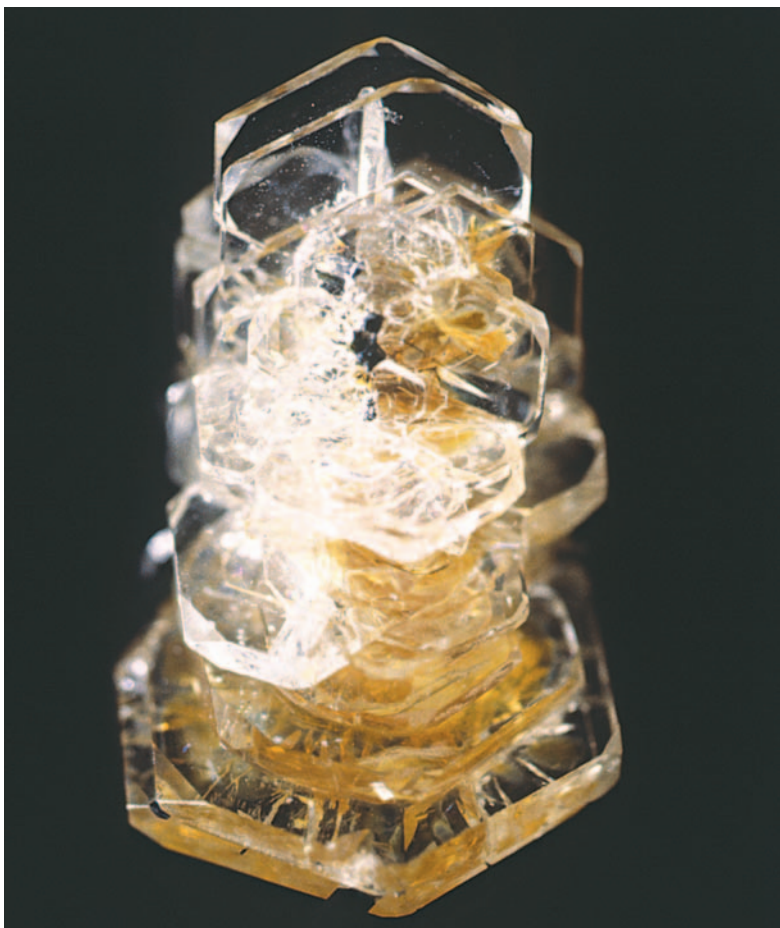
The largest and most famous deposit Itatiaia of pink beryl is in the region of Vale do Rio Doce, near the town of Conseilheiro Pena in the state of Minas Gerais. I had the opportunity to acquire three crystals of morganite from this mine, equal in size, each one 25 cm thick. These were probably parts of one larger oval 65-75 kg whole crystal, which split in three for tectonic reasons or because it contained admixture mineral phases. These three pieces were ideal for jewelry purposes and I showed them in exhibitions in Geneva in 1977 and in Paris in 1978 (at Montparnasse, sponsored together by Societe Français de Mineraux et Metaux and Societe de Rotschild). Among the samples of the collection given by me to the Museum of Natural History in Paris is a morganite crystal with a mass of 280 kg, found in 1973 in Conseilheiro Pena, Minas Gerais.

A morganite, processed in a square, with a mass of 278.25 carats from Minas Gerais, is kept at the American Museum of Natural History in New York (Harlow, Peters, 1994). Pink beryl is also described from the pegmatites to the north near Araçuai in the state of Minas Gerais (Karfunkel et al., 2002).

GOSHENITE

Preserved in my personal collection are also large platy crystals of colourless jewelry goshenite (Fig. 67-68). Usually these crystals are of a platy and not of a long prismatic habit.

↑ Fig. 67. Goshenite – a crystal with inclusions of tourmaline; the Deleff Collection.



➲ Fig. 68. Goshenite – a transparent crystal; the Deleff Collection.

OTHER BERYL

Brazil is a leading country in the extraction of beryl (Dias, 1973). Large and non-transparent crystals of beryl can reach a mass of several tons. A giant beryl of 69 metric tons was found in the Alto Boqueirao, near Parelhas, a 50-100 ton individual was reported in Alto Serra Branca in the state of Paraíba, and a 200 ton pinkish crystal has been mined from the Serra Branca mine (cit. after Sinkankas, 1981). The mineral is a source of the element beryllium which is used as a strategic raw material in different products for the elimination of radiation in nuclear reactors.

In 1976 in a hill not far from the town of Governador Valadares in the state of Minas Gerais, the Panambra S.A. Company found a giant beryl crystal of blue colour. Out of this crystal, after several months of breaking down by compressors, 36 tons of raw material were acquired for industrial purposes. It was a sensational discovery that such a large crystal could exist. The collection I gave to the Paris Museum in 1983 contains a blue beryl crystal weighing 260 kg, with a well-developed hexagonal prismatic form. A beryl crystal with a mass of 200 kg from the state of Minas Gerais is exhibited in the Museum of Mineralogy, Petrography and Mineral Resources of the University of Mining and Geology in Sofia (the Deleff Donation).

CHRYSOBERYL (ALEXANDRITE)

Chrysoberyl is known from many granite pegmatites, such as, for example, those near Santa Thereza, the state of Espírito Santo and Teófilo Otoni in the state of Minas Gerais (Franco et al., 1972; Proctor, 1988), as well as in the state of Bahia (Itamaraju, Teixeira de Freitas, Itanhem, Prado). Its jewelry varieties – alexandrite and chrysoberyl cat's-eye, are described and studied in eluvial, colluvial and alluvial placers, whereby the largest deposits are Córrego do Fogo, Córrego da Faisca and Hematita in the state of Minas Gerais, as well as Córrego Alegre (Colatina) in the state of Espírito Santo (Cassedanne, Roditi, 1993). It is mined as a by-product during the washing of alluvial placers for diamond, aquamarine or andalusite, but in the gravel sediments amethyst, garnet, smoky quartz and topaz are also to be found. In the region of Malacacheta is the Barro Preto chrysoberyl deposit, also known under the name Córrego do Fogo. Red chrysoberyls are common there, and in 1976 a 41-carat twined crystal was described.

In 1970, from the Santa Thereza mine, the largest known chrysoberyl in the world was mined in the shape of the letter V (adhesion) of a green-yellowish colour (Fig. 69). During the following year the sample was displayed at the international exhibition in the town of Governador Valadares and later its owner Mr Levon Nercessian showed it in exhibitions in Europe and the USA.

Alexandrite was mentioned for the first time by Aracuai and Minas Novas, and in 1828 some 8-kg chrysoberyl among the treasures of Rio de Janeiro was reported (Bauer, 1904). Yellow, olive-green, golden, brown and ruby-red crystals are found. Cat's-eye and alexandrite are extracted from alluvial and colluvial placers mainly from the valleys Americana and Santana near Padre Paraiso (Gil – Barro Preto) in the region of distribution of the Otoni-Maramkaia pegmatite field (Proctor, 1988). In the second deposit, findings are reported from as early as 1846. In 1960, a 785-carat chrysoberyl cat's-eye was reported.

After 1986, taking first place in the quality and volume of extraction of alexandrites in Brazil is the Lavra da Hematita deposit (Nova Era or Itabira) (Koivula, 1987b). The local seekers of minerals improperly call it "crisólita" – after the colour of gem olivine. A settlement of the same name even appeared. A greenish blue alexandrite is also there, known to the diamond seekers under the name "pavão". Alexandrite occurrences Esmeraldas de Ferros and the nearby Hematita deposit in the state of Minas Gerais yield up to 0.1 carats crystal of good quality, at the

⊂ Fig. 69. The largest crystal of chrysoberyl (**25 kg**) from the Santa Thereza deposit in the state of Espírito Santo.

average. The samples from the first deposit are often cracked by imposed tectonic processes (Karfunkel, Wegner, 1993).

TOPAZ

On the topazes from Brazil, that are bluish, yellowish or colourless, many works have been published (Olsen, 1971; 1972; Rolff, 1971; Fleischer, 1972; Bastos, 1976; Keller, 1983; Cassedanne, Sauer, 1987; Ferreira, 1987; Cassedanne, 1989b; César-Mendes et al., 2002b). The first yellowish to brown topazes in Brazil were found near Dom Bosco and Rodrigo Silva around Ouro Preto in 1735 (Bank, 1971). Topaz is extracted mainly from alluvial placers together with other precious minerals and, more rarely, from the pegmatite veins containing them.

Known from the country are the largest jewelry topaz crystals in the world. A orange-yellow crystal with a mass of 271 kg from the state of Minas Gerais, unique in its quality and dimensions, is kept at the American Museum of Natural History in New York (Sofianides, Harlow, 1990). Preserved in this museum are also the extremely valuable precious bluish Pellman topaz and a pale-blue topaz called Brazilian Princess, processed in the shape of a square cushion with 221 facets with a mass of 21 005 carats and sized 14.5 cm (Harlow, Peters, 1994). Other processed topazes with masses of 7 725 carats and 2 680 carats are known from the Smithsonian Institution in Washington, and with a mass of 5 800 carats in the Field Museum of Natural History in Chicago (Bariand, Poirot, 1985). A large gem quality topaz (117 kg) from Fazenda do Finil near Santa Maria do Itabira in the state of Minas Gerais is on display in the Natural History Museum in Vienna.

A pale-yellow topaz of 1 680 carats from Brazil with the designation Bragance that entered the Portugese regalia, was for a long time considered to be a large diamond.

The largest yellowish precious topaz in the world until the year 1990 with a 93 kg mass was a crystal from my collection – with an ideal jewelry quality. It was found in 1967 in Vale do Rio Doce in the state of Minas Gerais. Later I showed it during the exhibitions of my collections in Geneva in 1976 and in Paris in 1977.

➲ Fig. 70. Large blue topaz (**250 kg**) from the state of Rio Grande do Norte; the Deleff Collection (photo by P. Michel).

➲ Fig. 71. Pink tourmaline (rubellite) with quartz, platy albite (cleavelandite) and lepidolite (**220 kg**) from the Itatiaia mine, Conseilheiro Pena, the state of Minas Gerais (photo by A. Barbosa).

The two largest blue precious topaz crystals with excellent crystal faces in the world are part of my collection in the Museum of Natural History in Paris. One of them weighs 250 kg (Fig. 70), the other 200 kg, and they are really *vedeti* (most perfect). They were found in 1978 in the pegmatites of the state of Rio Grande do Norte.

Orange to pink-yellow "imperial" topaz has been reported to the west from Ouro Preto in the Capão mine, Minas Gerais (Bastos, 1976; Sauer et al., 1996; Schott et al., 2003). This is the oldest and most productive mine for topaz that is mechanized. After thermal processing, the brown samples receive the colour of a "a peach" or become pink. The crystals can be found in kaolinite veins among weathered brown talcized clayish mass. The largest sample had a mass of 1.3 kg. Pink topazes are reported and a transparent clear crystal is depicted with a mass of 36.87 kg. Other deposits in the region around the towns of Dom Bosco and Rodrigo Silva are Corrego do Cipo, Boa Vista and Vermelhão.

TOURMALINE

Brazil is famous for its tourmalines, various in colour and zonality, extracted mainly from the state of Minas Gerais (Proctor, 1985a; 1985b; Cassedanne, Roditi, 1996; Steger, 1999; César-Mendes et al., 2001). The richest and most famous for their pink tourmaline (rubellite) mines are Itatiaia (Jonas) and Galileia near the town of Conselheiro Pena, Golcunda, Cruzeiro and Virgem da Lapa, not far from the town of Governador Valadares, and in the Araçuai-Salinas region (Xanda, Limoeiro, Morro Redondo, Toca do Onça) in the northern part of the state.

The unique Forguete rubellite crystal was found with a lot of the finest rubellites (Fig. 59) in the Jonas pegmatite not far from Governadoir-Valadares by the garimpeiro Ailton Barbosa (three other giant crystals groups were named Joaninha, Tarugo and Flor-de-Liz with a weight of 225, 80 and 32 kg, respectively; Fig. 71; see also Fig. 72). It has been measured 1.07 m high, with a 125 kg mass, and is said to have been sold for $ US 1 000 000 (César-Mendes, 2000).

➲ Fig. 72. A group of exceptionally high-quality, transparent and rare polyzonal tourmaline crystals (**37 kg**) from the Salinas deposit in the state of Minas Gerais; the Deleff Collection.

Jewelry copper-containing elbaite tourmaline was found and described by São José de Batalha (Mina da Batalha a Nova Era), some 4.5 km northeast of Salgadinho, state of Paraíba (Ferreira et al., 1990; Fritsch et al., 1990; Henn, Bank, 1990; Henn et al., 1990; Rossman et al., 1991; Brandstätter, Niedermayr, 1994; MacDonald, Hawthorn, 1995). It is grayish green to "electric" blue and contains inclusions of native copper and tenorite CuO. Reported in blue tourmalines are admixtures of Mn^{3+} and/or Cu^{2+}, and in green tourmalines – only admixtures of copper.

Apart from the regions mentioned, jewelry tourmaline is also extracted from the states of Ceará (Solonópole, Quixeramobim, Quixadá) and Goiás (Manaçu, Reixe, Formoso, Crixás, Xambiocá).

SPODUMENE

The most famous mines for jewelry spodumene are near Vale do Rio Doce (Fig. 73) in the state of Minas Gerais. Clear bi-coloured kunzite is described from the region of Governador Valadares (Ralls, 1967) and Galiléia in the state of Minas Gerais, as well as near Itapuiuna, Jucá, the state

of Ceará, and green hiddenite – from the states Espírito Santo and Minas Gerais (Franco et al., 1972). Pink spodumene is also described from the pegmatites to the north near Aracuai in the state of Minas Gerais (Karfunkel et al., 2002).

Jair Medeiras was for many years my driver, company and bodyguard. He and I travelled many times around the whole state of Minas Gerais and became acquainted with all the large and small mines. When after a ten-year-long collaboration he mastered my profession, he wished to become an "indenpendant" (an independent seeker of minerals). I gave him my Jeep as a present and a good sum of money to continue his activity. Some time later he found and started to exploit the most famous mine for spodumene in Vale do Rio Doce. There he extracted hundreds of large and small crystals, transparent, pure and of jewelry quality, of different colours, exceeding, in total, a mass of 2 000 kg. After selling them he became very rich. This sounds like a legend but is a real fact.

QUARTZ AND ITS VARIETIES

ROCK CRYSTAL

Brazil is the country with the largest extraction of quartz for industrial purposes in the world ("piezzo-electrico", "optico" and "lasca"). Since the 40s of the previous century, tens and probably hundreds of tons of quartz have been exploited in order to meet the world's industrial demands. In the 70s, the yearly extraction of mountainous crystal in Brazil reached 6 000 tons (a maximum of 13 903 tons was extracted in 1968) with the leading participation of the states of Minas Gerais and Santa Catarina (Freitas, 1973; cf. Johnston, Butler, 1946; Karfunkel et al., 1998). Especially rich in quartz is the region of the valley of Rio Doce (Fig. 74-76). Although rarely, common among the samples of rock crystal are Japanese twins, some with rather large dimensions (Fig. 77).

Brazil extracts quartz with rutile inclusions that is valuable for various decorative products (Cassedanne, 1981a). Such samples in large quantities are known from the mines around the village of Ibitiara in the state of Bahia (Fig. 78).

➲ Fig. 73. Spodumene – a multicolour (passing from hiddenite into kunzite) crystal (**24 kg**), transparent and of jewelry quality, exceptionally unique in its beauty and perfection; the state of Minas Gerais.

Fig. 74. A transparent and defect-free pure rock crystal (**87 kg**) with the shape of a gothic cathedral, the region of Conseilheiro Pena, the state of Minas Gerais; the Deleff Collection.

Fig. 75. Double terminated samples of rock crystal from the Corinto deposit, the state of Minas Gerais; the Deleff Collection.

➲ Fig. 76. A group of two transparent to white quartz crystals (rock crystal) with a multitude of iridescencent effects (**700 kg**), the Deleff Collection – Giant Crystals, National Museum of Natural History, Paris.

➲ Fig. 77. Rock crystal twinned after Japanese law, sized **12 cm**, from the Gouveia mine, Minas Gerais; the Deleff Collection.

➲ Fig. 78. Quartz crystal with a large number of rutile inclusions from the Ibitiara deposit, the state of Bahia; the Deleff Collection.

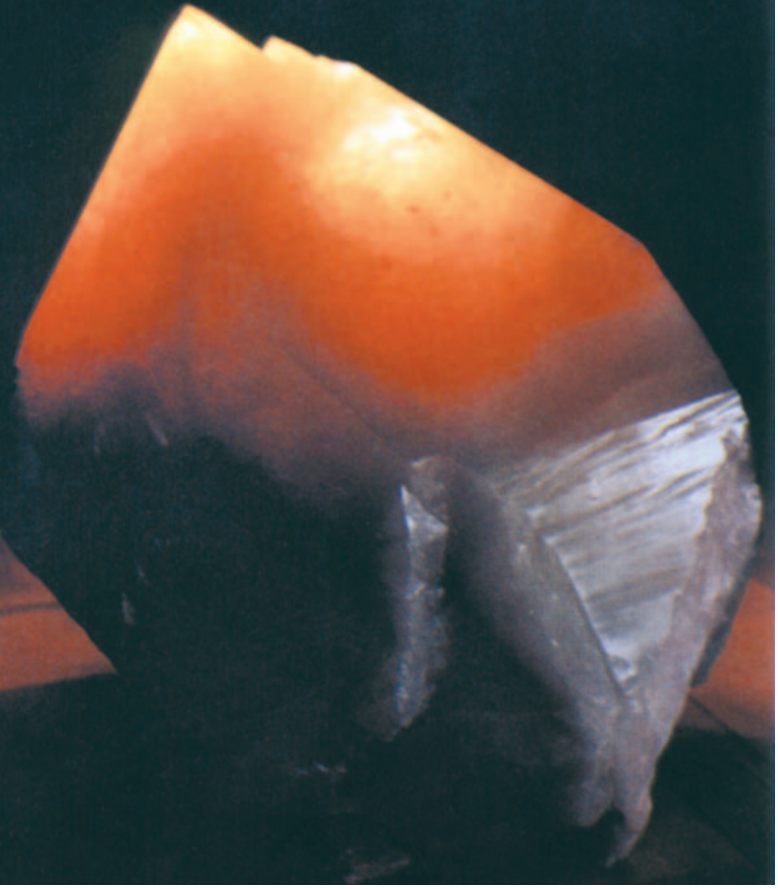


Fig. 79. Quartz (citrine) crystal (**400 kg**); National Museum of Natural History, Paris.

CITRINE, SMOKY QUARTZ AND MORION

The major deposits of these colour varieties of quartz are also along the valley of the Rio Doce, Conseilheiro Pena, Baxios, Campo Belo, Governador Valadares and Golcunda (Fig. 79-81). In the 70s, the yearly extraction of citrine in Brazil reached 30 tons (Freitas, 1973). Citrine is also reported from Campo Belo, Minas Gerais (Cassedanne, 1995). Black quartz was described by Vitoria da Conquista (Cassedanne, Cassedanne, 1973).

Fig. 80-81. A large crystal of transparent smoky quartz of jewelry quality (**137 kg**) from Conseilheiro Pena, the state of Minas Gerais at daylight and with an effect for a "fiery" colour.

AMETHYST

Brazil is the country with the largest and richest deposits of amethyst, especially from geodes in volcanic rocks (Fig. 82). The well-known deposits of amethyst of different genetic types are in the states of Minas Gerais (near Teófilo Otoni, Aracuai, Salinas), Bahia (Montezuma, Coruja, Brejinho, Cabeludos, Grota do Coxo – in the latter deposit with dimensions of the crystals up to 30 cm in height), Goiás (Minaçu), Piauí (Caldeirao), Ceará (Solonópol, Rusas, Batoc), Pará (at Alto Bonito, Pau d'Arco near Marabá with sizes of crystals up to 40 cm in height), Espírito Santo (Santa Maria), Mato Grosso (Coimbia), Santa Catarina (Campos Novos) and Rio Grande do Sul (the region of Palmeira to the south around Iraí and the region of Serra to the north and to the south around Soledade) (Brauns, 1919; 1932; Ferreira, 1962; Bank, 1969; 1970b; Cassedanne, 1972; 1986; Castro et al., 1974; Cassedanne, Cassedanne, 1975; 1976; 1977a; 1977b; 1979; Epstein, 1988; 1989a; Kostov, 1992; Lieber, 1994; Preister, 1999; Balzer, 1999). In the 1970s, the yearly extraction of amethyst in Brazil reached 250 tons (Freitas, 1973).

Distinguished are several genetic types of deposits of amethyst: amethyst geodes from toleitic basalts in volcanic trapps; hydrothermal veins in fault zones of crushing; in granite pegmatites; in granitoids with hematite and goethite; in placers of eluvial, colluvial and alluvial nature, including amethyst-bearing conglomerates (Cassedanne, 1988; Kostov, 1992).

❍ Fig. 82. The author and his wife Mrs Deleff in front of an amethyst geode (**700 kg**), cut in two, the Iraí mine in the state of Rio Grande do Sul; from his collection in the National Museum of Natural History, Paris (photo by Ch. de Rudder).

PINK QUARTZ

Unique is the deposit of crystalized pink quartz Alto da Pitora (Alto Feio) from the region of Governador Valadares in the state of Minas Gerais near Galiléia and Sapucaia (Berilo Blanco). Pink crystals develop in the pegmatite built up from white quartz, feldspar and spodumene, late albite and muscovite (Cassedanne, Cassedanne, 1978a; 1980; Cassedanne, Alves, 1991a; Cassedanne, Roditi, 1991). Also established are schorl, cassiterite, niobo-tantalite, beryl and phosphate minerals. Crystals with rutile needles (with a star effect) and tourmaline needles can be found. In my personal collection there are three beautiful geodes of crystallized pink quartz (Fig. 60).

One of the remarkable samples of rose quartz on smoky to citrine quartz, called Van Allen Belt from Lavra Berilo Branco, is kept in the Natural History Museum of the Smithsonian Institution in Washington.

Massive pink quartz is known from the pegmatites in the state of Ceará (Apuaires, Canindé, Caridade, Independência, Itapiúna, Russas and Tauá), Paraíba (Nova Palmeira and Pedra Lavrada), Minas Gerais (Almenara, Borda da Mata, Divino das Laranjeiras, Itinga, Sao Miguel do Jequitinhonha, Joaíma, Mantena, Monte Siao, Ouro Fino, Salinas and São João do Paradíso) and São Paulo (Socorro) (Azambuja, 1974). In the latter state, there is pink quartz at Morro do Gato (near Ariri).

AGATES

The major deposits and reserves of agate are concentrated in the state of Rio Grande do Sul. The major deposits there are Santa Maria, Soledade, Carazinho, Passo Fundo, Lageado, Espumos and Quarai (Mattos, 1974; Preister, 1999). In this state, fire agate has also been reported (Rykart, 1997). Other deposits of agate are known near Roraima, in Northern Brazil, Correntina and Condeúba in the state of Bahia, Monte Alegre de Minas in the state of Minas Gerais, Tatuí and Itapetinga in the state of São Paulo, Guarapuava in the state of Paraná and Armagem in the state of Santa Catarina (Mattos, 1974). The geometric peculiarities of agate geodes have been described (Cassedanne, 1983). Brazilian agates are distinguished by both their high quality, size and their extreme variety of iterating colour nuances of mainly chalcedony layers (Fig. 83-85).

Fig. 83. The author's wife, Mrs Deleff, with an agate slate from the state of Rio Grande do Sul.

Fig. 84-85. Agate from the state of Rio Grande do Sul, the Deleff Collection.

➲ Fig. 86. Pseudocrystal chalcedony epimorph from the state of Paraíba, cut in two, the Deleff Collection.

Polyhedral pseudocrystal agates are reported from the state of Paraíba that developed as quartz (chalcedony) epimorphs. These reach up to 20 cm in length and up to 2 kg in weight (Fig. 86). Goniometric investigations show that these are not chalcedony pseudomorphs after a given mineral but specific epimorphs that emerged in the filling up of irregular polyhedral spaces between platy, probably calcite crystals (papierspath) that were, at a later stage, decomposed (Deleff, Kostov, 1997).

OTHER PRECIOUS AND DECORATIVE MINERALS

The mineral brazilianite (found and named so according to its first finding in Brazil) of yellow to yellow-green colour is a typical pegmatite mineral (Cassedanne, 1981b). Well-known is the deposit of a 64 kg group of brazilianite crystals from Córrego Feio, Galiléia in the state of Minas Gerais (Franco et al., 1972). It can also be found near Conselheiro Pena in the state of Minas Gerais and near Pietras Lavradas in the state of Paraíba.

In my personal collection there are three large crystals of amblygonite (~10-15 cm), of jewelry quality. A yellow transparent amblygonite sized 8 cm and a processed sample of 34 carats from Linopolis, Minas Gerais, are exhibited in the American Museum of Natural History in New York (Sofianides, Harlow, 1990; Harlow, Peters, 1994).

Preserved in the Paris Museum of Natural History is transparent vivianite from Conseilheiro Pena, Minas Gerais. Petalite is described from Itinga in the state of Minas Gerais (Cassedanne, Cassedanne, 1978b). Coming from Brazil are also high-quality jewelry euclase of bluish-green colour, and scapolite, different in colour.

Among the samples of my collection in the Paris Museum of Natural History, there is a giant blue apatite crystal weighing 60 kg.

Rhodolite garnet (composed of 26% of pyrope and 66% of almandine) of amethyst colour has been described from placers near Fazenda Balisto, Peixe Municipio some 12 km west of Sao Valéria, Tocantins State (Wegner et al., 1998).

Precious opal of different colour and of good quality, without cracks, is known from placers of the Pedro II mine in the state of Piauí, some 200 km from the capital Terezinha (Sauer, 1982;

➲ Fig. 87. An amazonite crystal, unique in its shape, quality and colour, found near Vale de Rio Doce in the state of Minas Gerais; the Deleff Collection – Giant Crystals, National Museum of Natural History, Paris.

Bittencourt Rosa, 1990; Knigge, Milisenda, 1997). Red “fiery” opal was found near Soledade in the state of Rio Grande do Sul.

Brazil is among the leading countries extracting kyanite, mainly in the state of Minas Gerais (Nova Lima, Gouvea and Mateus Leme) around Belo Horizonte (Barone 1973). Many crystals can be transparent and can have jewelry applications. Transparent orange-brown triphylite with gemological properties has been described from the state of Minas Gerais (Cosar et al., 1990).

Among the decorative gem minerals, jadeite was found near Ibatuba, São Paulo, and nephrite – from Amargosa, Bahia (Franco et al., 1972).

Amazonite from granite pegmatite with albite, biotite and quartz has been described on the shore of Córrego do Patrimonio, Fazenda de Geraldo Duarte at about 100 km to the east of Belo Horizonte (Cassedanne, 1994) as well as in many other places in the state of Minas Gerais – Conseilheiro Pena, Santana dos Ferros (Fazenda Providencia), Monlevade and Santa Maria de Itabira.

The Paris Museum of Natural History keeps five of the giants among amazonite crystals from my collection (weighing 680, 450, 190, 170 and 50 kg). These samples are of amazingly high quality and perfection (Fig. 87). Alongside amazonite, in pegmatites there are also larger white

feldspar (orthoclase) crystals (Fig. 88). In the Paris Museum of Natural History in my collection there is a 50 kg orthoclase crystal.

Massive decorative pink rhodonite is known from Conseilheiro Lafaiete in the state of Minas Gerais, bright blue sodalite – from Itabuna (Fazenda Hiassu) in the state of Bahia, and a pale-blue turquoise was found near Remanso (Casa Nova), again in the state of Bahia.

Non-transparent to translucent lazulite from quartzites in the state of Bahia between the valleys of Rio Paramirin and São Francisco is offered as a new gemological material (Cassedanne, 1990). The mineral is extracted mainly in the regions Serro and Diamantina of the state of Minas Gerais.

Malachite from hydrothermal veins has been reported near Fundão, Itapeva, São Paulo (Franco et al., 1972) and near Serra Verde, Currionopolis, Pará (Collyer et al., 1991).

Decorative jasper (quartz-containing aggregates) in gray and red colours are known from Serra do Urucum, Corumba in the state of Mato Grosso, but these have also been described from the states of Piauí and Parana (Franco et al., 1972).

Fig. 88. Potassium feldspar (orthoclase) crystals with different habits from the state of Minas Gerais; the Deleff Collection.

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Ilia Deleff est né en 1921 en Bulgarie. Il quite son pays d'origine après la Seconde guerre mondiale. Il suit un long chemin, plein d'adventures, de lourdes épreuves et de malchances avant d'arriver à atteindre le pays de ses rêves – le Brésil. C'est un spécialiste dans le domaine de la géologie et de la minéralogie. Il est lauréat de prestigieux prix gouvernementaux français et bulgares dans le domaine de la culture et de nombreuses autres distinctions, ainsi que du titre scientifique d'honneur **"doctor honoris causa"**.

Convaincu que chaque cristal géant est comme un 'livre de pierre" portant en soi une information scientifique précieuse, il répand avec instance ses idées que les cristaux phénoménaux sont des créations naturelles qui doivent être sauvegardées et conservées pour l'humanité. La réalisation de ce noble but devient la raison de son existence.

Sa passion de collectionneur et son amour infini pour les phénomènaux de cristaux des minéraux sont la source principale de l'énergie inépuisable avec laquelle, durant plusiers décennies, il recherche, découvre et collectionne des cristaux naturels extrêmement précieux dans le monde entier.

Beaucoup de musées en Europe occidentale possèdent des collection précieuses ou différents échantillons de minéraux, fournis par I. Deleff. En 1983 la France devient possesseur d'une de ses remarquables collections de cristaux de quartz géants qui sont exposés dans le **Musée national d'histoire naturelle** à Paris et en 1985 il fait don à sa patrie la Bulgarie d'un collection particulière analogue de cristaux géants uniques qui est la partie la plus attractive du **Musée national "La Terre et les Hommes"** à Sofia.

Dans sons récit captivant l'auteur nous dévoile le monde merveilleux des cristaux géants unique et des trésors de minéraux remarquables du Brésil, ainsi que les incroyables aventures et les difficultés ayant accompagné sa vie, consacrée aux cristaux phénoménaux des minéraux.

Lilia Petkova