

## Chapter 14. Grothendieck's seminar in Montpellier

Apart from his lectures, a small, loosely connected group was gathered around Grothendieck in the form of a research seminar, whose subject dealt perhaps not so much with current themes as with topics that interested him at the moment. Grothendieck gave the young mathematicians suggestions for their own research work, which generated some Ph.D. dissertations. Members of this research group at different times were, among others: Claude Borras, Monique Borras, Carlos Contou-Carrère, Pierre Dampousse, Monique Hakim, Olivier Laborde, Yves Ladegaillerie, Olivier Leroy, Jean Malgoire, Françoise Meden, Bernard Roux, Hoang-Xuan Sinh and Christine Voisin. Of these, Sinh, Hakim, Ladegaillerie and Contou-Carrère received doctorates under Grothendieck. Contou-Carrère, Ladegaillerie, Malgoire and Voisin remained in Montpellier as lecturers, and apart from occasional periods of residence in other countries, spent their whole professional careers there.

The author was not able to form a clear picture of this group. The meditation *Récoltes et Semailles* contains some very scattered information about the work Grothendieck did together with these researchers, but some of his remarks are very subjective. In what follows we will confine ourselves to a few disparate and rather superficial comments.

It would seem that during his first years in Montpellier, the person who had the closest contacts with Grothendieck was Yves Ladegaillerie. Ladegaillerie had arrived in Montpellier in 1970 at the age of twenty-two. As a young *normalien* (student of the Ecole Normale), he had passed the *agrégation* the previous year, and then written a doctoral thesis at the Henri Poincaré Institute in Paris. In Montpellier he was given a position more or less analogous to that of assistant professor. Shortly after his arrival, Grothendieck suggested that they work together on a research project and that Ladegaillerie write a *these d'état*<sup>1</sup> with him. He suggested a subject from plane topology, about which he had a few ideas but no deep knowledge – as both he and Ladegaillerie wrote – and Ladegaillerie, at least at first, even less. Like all Ph.D. students, Ladegaillerie praises his thesis advisor in

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<sup>1</sup> At that time in France, graduate students first wrote a thesis that was somewhat more than a Master's thesis but less than a Ph.D., and later wrote a higher thesis that gave them the right to direct research students, analogous to the "Habilitation" thesis in France or Germany now.

the highest terms<sup>2</sup>:

For a young man like me, working with Grothendieck was an incredible experience. He always had time and was a model of patience when explaining his methods and his vision of mathematics. I will never forget the evenings spent putting our heads together in Villecun, doing math by the light of the petroleum lamp. In Paris, I had had some of the most important mathematicians of our time as professors, from Schwartz to Cartan, but Grothendieck was completely different, an extra-terrestrial. Instead of translating things into another language, he thought and spoke directly in the language of structural mathematics, to whose creation he had contributed so much.

In 1975, Ladegaillerie proved the main result of his *thèse*, the so-called isotope conjecture. He defended it one year later in Montpellier, under the title *Découpes et isotopies de surfaces topologiques*. In *Récoltes et Semailles* Grothendieck describes Ladegaillerie as one of his most brilliant students. Besides this he mainly writes of the difficulties that Ladegaillerie experienced in trying to get his thesis published. It is common knowledge that one of the principal themes of *Récoltes et Semailles* (see Chapter 23) is Grothendieck's conviction that the mathematical establishment ignored, distorted, obstructed, chopped up and "buried" his mathematical work. He was equally convinced that after 1970, his students were also affected by this hostility. (At one point he wrote that what once had been a living organism had landed in pieces in the soup bowls of the users.)

We already mentioned the Vietnamese mathematician Hoang Xuan Sinh in connection with Grothendieck's trip to Vietnam in November 1967 (see Chapter 3). She spent a year in Montpellier, and with Grothendieck as her advisor, received her doctorate in 1975 with a thesis on gr-categories at the University of Paris VII. This appears to have been her only mathematical paper.

Grothendieck and Sinh were involved for some time in an intense personal relationship, although Sinh was married in Vietnam and had a son. Around 1979/80 she was in France again, because Johanna Grothendieck recounts that she spent a few weeks in La Gardette (see Chapter 19). Contact between Sinh and Johanna, and also Grothendieck's longtime partner Y., lasted for a long time. Johanna's opinion is that Sinh was one of the few women who understood that one could not "take possession" of Grothendieck.

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<sup>2</sup> Y.Ladegaillerie, *Alexandre Grothendieck après 1970*, unpublished manuscript, 2004.



Hoang Xuan Sinh around 1975

Grothendieck took a special interest in Contou-Carrère's progress, although it took some time before they really got to know each other. Contou-Carrère has told the author that in 1973 he visited Grothendieck in Villecun together with Pierre Cartier, at a time when Justine was still living there with her baby. (This must have been in November or December.) Later on, if Grothendieck did not feel like returning to Villecun after his lectures, he would often stay overnight at Contou-Carrère's home in Montpellier. They would talk about mathematics for the whole night, discussing for example questions related to Grothendieck's lectures on polyhedra and combina-

torics.

Grothendieck's recollections of his early contacts with Contou-Carrère are somewhat different; he writes in *Récoltes et Semailles*:

My first encounters with Charles Contou-Carrère took place in the hallways of the math institute, shortly after my arrival in Montpellier in July 1973. He trapped me in a dark corner in order to shower me with a torrent of mathematical explanations. [...] And this took place at a period in which I was absolutely not focused on mathematics. For one or two years I escaped whenever I saw his silhouette appearing at the other end of a corridor. And so things remained until the moment when Lyndon, who was spending a year in Montpellier as a visiting professor, led me to understand that Contou-Carrère had exceptional abilities, but was about to be shipwrecked because he didn't know how to use them. [...] Perhaps Lyndon's hint came just at the moment when I was beginning to get interested in mathematical questions again.

Grothendieck mentions Contou-Carrère relatively often in *Récoltes et Semailles*, but also writes that he only supervised his *thèse d'état* from a distance. According to his own statements, however, Grothendieck contributed essential ideas to the gradually emerging dissertation. A number of years passed before Contou-Carrère finally received his doctorate. His thesis defense took place on December 19, 1983. The title was *Géométrie des groupes semi-simples, résolutions équivariantes et lieu singulier de leurs variétés de Schubert*. Among other members of the jury were Cartier, Giraud and Grothendieck.

It has not been possible to learn any useful information about Grothendieck's influence on his doctoral student Monique Hakim.

One of Grothendieck's last students was Pierre Damphousse; perhaps more precisely one should say that he could have become one of Grothendieck's last students. In September of 1975, Damphousse came to Montpellier with a master's degree from Laval University, accompanied by his wife and two small daughters, but with little in the way of financial means. His intention was to study with Peter Hilton, whose planned guest residency, however, fell through shortly afterwards. At a loss he turned to Grothendieck. His impression of his first visit to Grothendieck has already been quoted. Grothendieck questioned him thoroughly on his background knowledge during their walk together, accepted him as a student, and suggested a subject which required little formal background knowledge and which could be tackled by an "unformatted spirit", namely the classification up to isomorphism of finite cellular maps. Advisor and student held regular discussions, during which Damphousse often had the impression that "his

drinking glass should be able to contain whole rivers”.

It is interesting to observe which books and papers Grothendieck recommended to his thesis student: *Generators and Relations for Discrete Groups* by Coxeter and Moser, *Algebraic Topology* by Massey, Klein’s book on the icosahedron and the quintic function, and almost everything that could be found in the library on tessellations, tilings and patterns. In addition there was, among other things, a paper by Epstein on curves and planes, and Ladegaillerie’s thesis. One may suppose that this list reflected two different things (which is why we quote it here): a profound change in Grothendieck’s mathematical interests as well as an insightful understanding of the needs of a student and prospective colleague. It took Damphousse almost the whole of 1976 in order to work through this list. He met regularly, though not frequently, with Grothendieck, mostly in Villecun, where every possible detail was discussed for hours on end. But Grothendieck also recommended “mathematical meditations as a spiritual adventure”. Damphousse, however, with the responsibility of a young family and having used up all his money, was not especially in the mood for “adventures” of any kind. He urgently needed a job, and finally got an offer at the end of September 1976 in Tours, which he promptly accepted. Grothendieck did not approve, and although he accepted the decision, he was still of the opinion that one could get by with much less money and live much more simply. For almost a year they continued to discuss the thesis project, which had already been started, during visits that took place about every two months, but in the long run this rhythm could not be maintained and the thesis was not completed. “We stayed in touch and exchanged letters, and he [Grothendieck] continued to express a friendly interest in my children and myself. But after May 1981 we did not have any further contact.”

Damphousse’s account contains more details (about Grothendieck’s eating habits, his car, his “driving skills”, his relationship to the university administration, his lectures, his relationships to students and colleagues, etc.), which largely confirm what has been related elsewhere in this book, and which it is therefore not necessary to repeat.

One of Grothendieck’s younger colleagues in Montpellier, Jean Malgoire, plays a particularly important role in his biography. In 1990, when Grothendieck was preparing his departure from Mormoiron (more on this in later chapters), he entrusted Malgoire with his scientific “legacy”: books, reprints, thousands of pages of mathematical notes and manuscripts in different stages of formation and completion, as well as large parts of his carefully ordered scientific and private correspondence, which comprises

several thousand pages. At Grothendieck's request, Malgoire traveled to Les Aumettes and took charge of several boxes containing this material. On this occasion Malgoire caught sight of the old oil drum which, to judge from the ashes it contained, Grothendieck had made use of to burn huge quantities of paper. According to Grothendieck's own account<sup>3</sup>, this took place in June 1990. Malgoire also, later, received explicit permission to deal as he saw fit with the material he had received, which enabled for instance the publication of the Grothendieck/Serre correspondence<sup>4</sup>.

There was little communication between Malgoire and Grothendieck after 1990. A few letters from Grothendieck in 1999 contained requests for books and also some obscure mathematical questions, for example concerning the prime factorization of numbers of the  $3^n + 1$ . (Grothendieck was convinced that certain cosmic values such as the number of elementary particles in the universe, the number of seconds in an "eon", and also the number of plant or animal species are exactly of this form.)

A touching document sheds light on the relationship between one of Grothendieck's students and his *maître*. Upon receiving three sections of *Récoltes et Semailles* in 1985, this student wrote a long letter to Grothendieck (fourteen dense handwritten pages), which is doubtless partly a reaction to the paranoia that surfaces in *Récoltes in Semailles*, and in which he examines their mutual relationship and Grothendieck's influence on his environment and the people around him. It is clear that the letter, which is at all times filled with sympathy and respect, is nevertheless an honest and unvarnished attempt at taking stock of the situation. The author, probably guessing that he would not succeed, concludes as follows:

It is just obvious that this letter will not give you much pleasure, because you are not prepared to accept any other opinion about yourself except one hundred percent approval. [...] Very simply: I do not raise you onto a pedestal, but see you as a human being, neither better nor worse than others, and actually I feel affection for you and I don't have much cause to reproach you with anything ... but can you even understand that? [...] Let me end by saying that in my heart and mind there will always be a place for the Alexandre Grothendieck that I had the luck (and for me it was luck!) to meet in 1973.

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<sup>3</sup> Letter to the author from 2010.

<sup>4</sup> P. Colmez, J.-P. Serre (editor) *Correspondances Grothendieck-Serre*, Paris

As said above, open and honest criticism is expressed in this letter, such as the following sentences:

I also think that you are mostly responsible for the way certain personal relationships veered off course [...]

Personally I strongly oppose your will to dominate, above all (and it is very often the case) when you do it in ways that are totally inappropriate, which often lead to nothing other than humiliation [...]

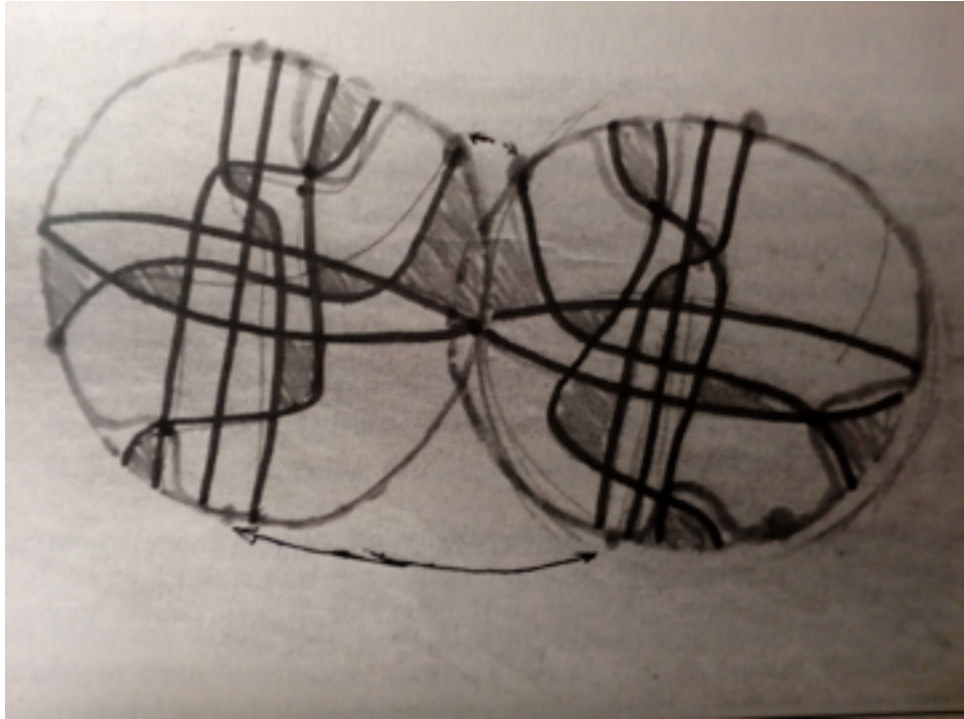
In this regard I have often noticed a lack of tact (that is, basic politeness), which expresses a certain lack of respect for others, in that you regard these others simply as, let's say, matters you have to deal with.

Perhaps this letter is a little self-involved, and sometimes borders on self-pity. In any case Grothendieck's answer comes off as uncouth; among other things he writes:

These contrivances 'to please' naturally eliminate much of the interest in your letter, [...] They remind me of the fantasies of a little boy who wets his bed in order to get the attention of his Mama or even his Papa, why not. But I am not your Papa.

And he concludes, as so often, with a little admonition:

One last thing. I would prefer if you did not address me by my first name, as this is a sign of intimacy or of a relationship characterized by sympathy and affection, which has disappeared – it sounds wrong, at least to my ears.



Mathematical sketches by Grothendieck  
(for a student or in connection with a lecture)

