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## **A Collective Biography of an Emerging Professional Group Chemists Funded by the Caisse Nationale des Sciences (National Fund for Sciences) in the 1930s**

Martine Sonnet<sup>1</sup>

In France, since 1901, the *Caisse des Recherches Scientifiques* (Fund for Scientific Research) funds, with a very limited budget, laboratory equipment and scientific publications, but does not directly fund researchers through grants. The *Caisse Nationale des Sciences* (National Fund for Sciences, hereafter referred to as *CNS*), created in 1930, reflected a new political will of the State to provide human resources for public research outside of the academic system. The *CNS* rewarded the efforts of prestigious scientists<sup>2</sup>, encouraging the French Government to align itself with the German Kaiser-Wilhelm-Gesellschaft and the Belgian *Fonds national de la recherche scientifique*. In 1935, the *Caisse des Recherches Scientifiques* merged with the *CNS* into the *Caisse Nationale des Recherches Scientifiques*. The first left-wing French Government of the *Front Populaire* then established an Under-State Secretariat for Scientific Research<sup>3</sup>, which would provide a final decisive impulse before the existent *CNRS* (*Centre National de la Recherche Scientifique*) was created, in September 1939. This article shall focus on the two *Caisses*, from 1931/32 to 1938/39.

As early as 1931, the *CNS* set up four levels of renewable grants, which could last for one, three or five years. These could be full grants for scientists without any other paid employment, or partial grants (a half or a quarter), awarded according to personal employment positions. Definitions and stipends of the three highest levels represent the academic ranks of Head of Works, Lecturers and Professors. Nevertheless, the *CNS* only offered precarious positions with no social protection. The *CNS* grade scale includes:

- Fellowships (*bourses*): to give an opportunity to beginners in research who are not yet graduated;
- Grants for Researchers (*Chargés de Recherche*): for researchers who had successfully demonstrated professional ability and skills, and were expected to later devote their careers to science;

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<sup>1</sup> IHMC CNRS/ENS/PARIS I

<sup>2</sup> Mainly Jean Perrin, André Mayer and Marie Curie.

<sup>3</sup> The *Front Populaire* would promote both scientific research and women's role in it, appointing Irene Joliot-Curie as the first Under-State Secretary (5 June - 28 September 1936).

- Grants for Heads of Research (*Maîtres de Recherche*): for distinguished scholars with authoritative publications;
- Grants for Senior Researchers (*Directeurs de Recherche*): for the same profile as the previous, but even more distinguished and authoritative - usually older.

Scientists awarded grants were required to submit annual activity reports to the disciplinary scientific committees, which decided on the renewals and examine new candidates. Field committees were set up for Mathematics, Physics, Chemistry, Biology, and Natural Sciences<sup>4</sup>. In 1935, new rules established two new specific committees, one for Mechanics, Statistics and Astronomy, and another for Medicine.

### **What place for Chemists in the CNS?**

This text is based on the documentation produced each year by the *CNS*<sup>5</sup>, (lists of beneficiaries and activity reports), completed for 1938/1939 by the census of scientific personnel, drawn up to prepare scientific mobilisation in a pre-war context<sup>6</sup>, and on the *CNRS*<sup>7</sup> archives. It was possible to reconstitute the scientific population funded by the *CNS* between 1931/1932 and 1938/1939: 135 women and 715 men in the area of the Exact Sciences<sup>8</sup>, which included 37 female and 155 male Chemists. Scholars who belonged to the area of Chemistry are referred to as Chemists, with no regard for the specific nature of their works. This article shall focus on the individual researchers, their living conditions and career development.

Inside the *CNS*'s Exact Sciences cohort, Chemists account for the largest group, and second largest in terms of the number of women rate (Table 1). The 16% women average rate in the Exact Sciences - with a gap between Mathematics and Biology or Chemistry -, is higher than in the Humanities and Social Sciences, where it only reaches 12%.

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<sup>4</sup> Humanities and Social Sciences included only two committees, Historical and Philological Sciences, Philosophical and Social Sciences, which were later subdivided.

<sup>5</sup> Mainly *Archives Nationales*, F17 13331 and F17 17458-17461.

<sup>6</sup> *Archives Nationales*, 1980284/24-27.

<sup>7</sup> Mainly personal files, *Archives Nationales* 20070296.

<sup>8</sup> In addition 29 women and 225 men in Humanities and Social Sciences, a relatively undeveloped field inside *CNS*.

Table 1. Scholars funded by the *CNS* between 1931/1932 and 1938/1939:  
Distribution of disciplines and number of women rates.

Areas	Total number of scholars	Women		Men
		Number	Women rates	Number
Chemistry	192	37	19%	155
Physics	179	17	9%	162
Natural Sciences	166	28	17%	138
Biology	150	40	27%	110
Mathematics	71	2	3%	69
Medicine	51	8	16%	43
Mechanics, Statistics and Astronomy	41	3	7%	38
Total in the Exact Sciences	850	135	16%	715

To fully assess the place of Chemists, their number must be related with the status they had at the time of recruitment. When joining the *CNS*, 88% of the male and 92% of the female Chemists received only a fellowship grant. In comparison, those number fall to 73% male and 90% female scholars in the other areas combined. The figures fall to 56% for male Mathematicians. Chemists seem to be the most disadvantaged starters, and it is unsurprisingly worse for women. Only three women appear among the 21 Chemists who were initially granted with more than a fellowship grant. Of the 18 men, 12 were Researchers, two were Head of Research and four were seniors<sup>9</sup>. 77% of the male and 73% of the female Chemists received a reduced grant versus 71% and 69% in other areas<sup>10</sup>. Regardless of the area, women more often received full grants, but this small relative advantage also shows that women face more difficulties when trying to get employment outside of the *CNS*.

Table 2 compares the ages of recruitment for each level<sup>11</sup> in order to determine if the Chemists' higher rate of fellowships could reflect their youth. As can be seen, fellowships in Chemistry are presented one or two years earlier than those of their colleagues<sup>12</sup>. Conversely, male Chemists recruited at a higher level were older than other scholars at the same stage of their career. This observation suggests a specific career path in Chemistry. Furthermore,

<sup>9</sup> Joseph Bougault, Robert Lespieau, Paul Sabatier and Jean-Baptiste Senderens.

<sup>10</sup> Based on the available amount of grants for 142 of the male and 33 of the female Chemists, and 518 of the men and 89 of the women from other areas.

<sup>11</sup> The years of birth, like all the biographical information, have been mainly collected from archives listed in the notes above 5, 6, 7. General, scientific and academic biographical dictionaries and yearbooks, catalogs of libraries, reviews tables and indexes, and "Google ocean", have provided complementary identification (especially genealogical websites). Birth years are known for 37/37 of the female and 150/155 of the male Chemists, and for 95/97 women and 527/565 men from other areas. Median ages were not calculated for groups that had less than 10 scholars.

<sup>12</sup> Only in Mathematics new fellowship beneficiaries are younger, with an average age of 27 for men; the only two female mathematicians arrived at 28 (Marie-Louise Dubreil-Jacotin) and 29 (Marie Charpentier).

Table 2 shows that, overall, female careers were delayed, and even more so when considering that men spent at least one year fulfilling their military obligations.

Table 2. Average and median ages of scholars at recruitment by the *CNS*

	Chemists				Non Chemists			
	Women		Men		Women		Men	
	Average	Median	Average	Median	Average	Median	Average	Median
Fellowships	30,5	29	29,5	28	31,5	30	31,5	30
Researchers	42,5	-	43	40	44	-	40,5	37
Heads of R.			56	-	65 <sup>13</sup>		48	47
Senior Res.			73,5				66,5	71

Even though a PhD, even in progress, was not compulsory, 79% of the female and 61% of the male Chemists advocated getting one before or during the year that follows their recruitment. In the long term, 89% of the women and 88 % of the men got one. In other areas, 85% of the women, the same rate as men<sup>14</sup>, would obtain this degree at some point, but only 59% among the women and 62% among the men would get it as early as the Chemists. The relative youth of Chemists does not mean that they had a lower degree than their colleagues, and regarding women the opposite was actually true.

Apart from having a doctorate, or instead of it, 44% of the male and 16% of the female *CNS* Chemists were Chemical engineers; 13% of the men and 11% of the women were Pharmacists; and 14% of the men and 5% of the women had the secondary school *agrégation* before being recruited. The *agrégation* was more frequent in other areas: 32% male and 9% female who were scholars from other areas had it. Among the men, at least, the presence of alumni from the *Ecole normale supérieure* was lower in Chemistry (7%) than in other areas (17%). This figure, considered along with the relatively strong presence of engineers among them, places the Chemists' cohort on the fringe of the most prestigious academic path, thus confirming their specific career path.

Once recruited, Chemists tended to leave their position in the *CNS* earlier and more frequently than their colleagues from other areas (Table 3)<sup>15</sup>.

<sup>13</sup> The unique case of Marcelle de Heredia Lapique.

<sup>14</sup> Based on all *CNS* female non-Chemists (98) and on a representative sample of 105 male non Chemists.

<sup>15</sup> Based on the overall *CNS* population recruited between 1931/32 and 1935/36 for the length of 3 years, 1931/32 and 1934/35 for 4 years, 1931/32 and 1933/34 for 5 years, 1931/32 and 1932/33 for 6 years.

Table 3. The length of service of Chemists and other scholars in the *CNS*.

Time at the <i>CNS</i>	Chemists		Other scholars	
	Women	Men	Women	Men
At least 3 years	83%	78%	85%	81%
At least 4 years	67%	65%	73%	67%
At least 5 years	39%	47%	71%	55%
At the <i>CNS</i> for at least 6 years	32%	29%	67%	51%

Considering the length of service and both sexes, Chemists remained proportionally less than their colleagues. This trend is particularly strong after the regular four years in the *CNS*, which was the normal duration required to become a Researcher. Nevertheless, the high departure rate among Chemists at this stage cannot be explained by a lack of promotions. After 5 years as fellowship beneficiaries, the five female Chemists represented got a Researcher grant, as well as 33 of the 38 men; in other areas the rate of promotion is lower for women – 23/29 – and slightly lower for men: 81/97. Consequently, the final gap between Chemists' and other scholars' length of service in the *CNS* seems mainly due to a labour market that offers many opportunities in the chemical industry. For non-Chemists, another remarkable point in Table 3 is a constant relative female over-representation: this trend confirms that scientific graduate women, under-recruited in universities, were especially available for long-term *CNS* grants.

### **Robot-portraits of typical *CNS* Chemists**

After assessing the Chemists' place in the *CNS*, I shall briefly summarize the main aspects of their profiles and the balance between their professional/personal lives through robot-portraits, based upon the cohort's prevailing statistical features. The female Chemist shall be named Suzanne and her male colleague Pierre, the most frequently encountered first names among them. We already know that both Suzanne and Pierre have joined *CNS* by age 30 in order to receive half-fellowship grants, having already defended their PhD or being very close to doing so, and that they will stay there for four years.

Suzanne and Pierre are born in mainland France, like 78% of female and 88% of male *CNS* Chemists and, respectively, 79% and 81% of their colleagues<sup>16</sup>. Among all scholars, male Chemists represent the lowest rate of scholars originating from Colonial and Overseas France (2%) and from foreign countries (10%). Like 38% of the female Chemists born in

<sup>16</sup> Based on 37/37 identified women's birthplaces and 139/155 for men in Chemistry; for the other areas, 90/97 and 484/565, respectively.

mainland France, Suzanne is born in either Paris or its suburbs and Pierre, as 38% of the male Chemists, in a small town<sup>17</sup> or village – as only 28% of them were born in Paris or its suburbs. Being a Parisian seems to be an asset for women. Regardless of their place of birth, Suzanne and Pierre get their doctorates in Paris, like 85% of the female and 74% of the male *CNS* Doctors in Chemistry. Chemical Engineering Degrees are less centralized: only 59% of male Engineers are graduates of the Parisian Chemical School or Institute<sup>18</sup>, the others coming mainly from Strasbourg, Lille, Mulhouse and Nancy; some of them later defend a PhD in Paris.

Suzanne and Pierre work in a Parisian laboratory, like 81% of the female and 69% of the male *CNS* Chemists - women again being the most Parisian. Suzanne is based in the Science Faculty, like 17/28 of Parisian female Chemists, compared with only 28/103 of her male colleagues. Pierre gets other opportunities, at the *Collège de France* (13/103) or at the Pharmacy Faculty (8/103)<sup>19</sup> for example. Receiving partial grants, Suzanne and Pierre complement their income, most likely as *Assistants* (30 of the male and 8 of the female Chemists) rather than as *Préparateurs* (20 and 3) or *Chefs de Travaux* (15 and 5). Only male *CNS* Chemists are also secondary teachers (6) or higher education professors, active (4) or retired (4). Working in Paris, Suzanne and Pierre live on the left bank of the Seine, where the Science Faculty and major scientific institutes are located. Almost three-quarters of Parisian *CNS* Chemists live in the 5th *arrondissement* and its boundaries with the 6th, 13th and 14th<sup>20</sup>: of the known personal addresses, 30/39 of the women and 63/88 of the men are located there. The proximity between their home and the laboratory makes it easier to balance family and work, particularly when some experiments need constant monitoring.

This issue of balance is all the more important since Pierre - like three-quarters of the male *CNS* Chemists, and Suzanne - like half of the female ones, will get married at least once in their lives<sup>21</sup>. Pierre is already married or will be married during the first year of his grant (based on 53 of 83 men with a documented wedding year) but it's not so obvious for Suzanne: only 9 out of 18 of the female Chemists experience marriage so early. Among the married *CNS* Chemists, at least three-quarters of the men and half of the women already have

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<sup>17</sup> Neither a *Préfecture* nor a *Sous-Préfecture*.

<sup>18</sup> *Ecole Supérieure de Physique et de Chimie Industrielles de Paris (ESPCIP)* or *Institut de Chimie de Paris (ICP)*.

<sup>19</sup> A few female or male *CNS* Chemists are also hosted by the *Institut de Biologie Physico-Chimique*, the *Ecole des Hautes Etudes*, Medicine and Pharmacy Faculties, the *Conservatoire National des Arts et Métiers* or the *Muséum National d'Histoire Naturelle*.

<sup>20</sup> Including the Montagne Sainte-Geneviève and the Quartier Latin, where housing is financially impossible for young scholars today.

<sup>21</sup> Marriages are confirmed for 117/155 of the male and 18/37 of the female *CNS* Chemists. Meanwhile almost 1/3 of them remain definitively single (13/37).

or will have children<sup>22</sup>. Therefore, Pierre and Suzanne can be both considered parents, but with significantly different family sizes. Two children at most for Suzanne, but three, four or more for Pierre; in both cases, the first one is born within the first year of marriage.

The smaller size of Suzanne's family is linked with the fact that she keeps working after childbirth, whereas Pierre's wife could be a housewife. The marriage pool for Pierre includes unemployed women, while Suzanne's sustained commitment to a scientific career leads her to choose her husband from a pool of scientists, researchers or teachers. This is the case for 11 out of 15 of the married *CNS* female Chemists whose husbands' occupation is documented. Among these 11, five of them are even married to a *CNS* colleague. For the 117 married men in the cohort, the occupation of only 29 of their wives is known, which suggests a low rate of employment for the wives. However, as shown from many of the male scholar obituaries, unemployment does not necessarily mean a lack of unpaid scientific cooperation. The 29 wives with identified occupations reflect a strong professional endogamy: if Pierre's wife happens to have a paid job, she is likely to work in chemical research (public rather than industrial) or teaching, and they might have met while they were students.

Endogamy prevails in the small world of *CNS* scholars, but Chemistry seems to be a little more open from the point of view of its social recruitment<sup>23</sup>. If Suzanne and Pierre, like 15% of *CNS* Chemists, have a father - and a mother if ever she had a profession - leading a teaching career (regardless of level), it corresponds to the case of about 30% of their colleagues in other areas. Half among Chemists also reduce the second largest group of paternal professions - Physicians/Pharmacists/Veterinarians: 10% *versus* 20%. The social origin of the Chemists is consequently more diverse, particularly with parents coming from some professions such as engineers, or jobs connected with commercial and manufacturing activities, and also from lower classes (farmers or craftsmen, for example). For the *CNS*, this confirms observations about academics in science faculties, where Chemists seem to be « new men »<sup>24</sup> when compared with scholars from other scientific disciplines - particularly Mathematics and Physics, the most socially elitist. What is more, in the *CNS*, 1/5th of these new men are women!

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<sup>22</sup> The male rate is probably undervalued because, at this stage of the study, biographical information of men is less comprehensive than of women.

<sup>23</sup> Based on the paternal professions (and very few maternal ones) that are known for 58 of the male and 14 of the female *CNS* Chemists and, unfortunately, for a very small sample of 26 fellowships belonging to other areas. Such a small group of women represented in this topic makes us consider women and men together, which needs to be considered with a great deal of caution.

<sup>24</sup> Christophe Charle, *La République des universitaires, 1870-1940* (Paris: Seuil, 1994), 155-156.

### **Conclusion: long careers and long lives for *CNS* Chemists**

What happens to Suzanne and Pierre after their years in the *CNS*? Among the 37 female Chemists, six unfortunately died prematurely, before the age of 60, 10 were disappear from the record before that age, 14 can be followed until retirement, and 7 others are still working at the age of 60 - and are not followed up to their retirement.<sup>25</sup> Altogether 21 women had long careers, attested until at least the age of 60.<sup>26</sup> We can thus presume that Suzanne shall be one of them. Among the 155 male Chemists, 11 died before the age of 60, and 27 disappeared from the record before that age. Among the other 117, 68 were followed until their retirement (at least 57 of them) or their death while still active after 60 (11 of them), and 47 remain alive and working after 60, and are not followed until their retirement. We can consider Pierre to belong to the group of 115<sup>27</sup> male workers with long careers. Referring to the initial cohort and with the exception of premature deaths, an active career carried on until the age of 60 and over represents at least 68% of the women and 80% of the men. This relatively low difference confirms a strong and sustained commitment to public research or higher education, in the case of women devoting themselves to scientific careers before the Second World War. *CNS* Chemists that were followed until the end of their career retired mainly from the *CNRS* or science faculties. Suzanne shall retire from the *CNRS*, where she would become a Senior Researcher, and Pierre from a Science Faculty as a Professor. The faculties remain reluctant to allow female access to higher positions. The industrial activities identified concern men only, at least 20/74 among those who disappeared from the record before retirement, and one among those whose entire career is known.

Referring to the initial cohort of young Chemistry fellowship beneficiaries who began a long career with the support of the *CNS*, only one, Alfred Kastler, would win a Nobel Prize. Suzanne and Pierre, who did not achieve this fame have, last but not least, a long retirement ahead of them: the average age of death for female *CNS* Chemists is 86, 81 for their male colleagues, and the cohort's deans reach 104 in both sexes!

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<sup>25</sup> The legal age for retirement in these careers for this generation may reach 70.

<sup>26</sup> Among the 21 females with the longest careers, 10 are married and nine are single, the two others remained single at the ages of 41 and 44, but their final marital status is unknown.

<sup>27</sup> The unknown year of birth for two of the men explain the difference between 117 and 115.