

• **ABSTRACT**

The history of scientific societies appears to be better known than their contemporary structures and functions. Through a detailed analysis of the structure of one disciplinary society — the West-German Gesellschaft Deutscher Chemiker (GDCh) — it is shown that such a society plays an important role in the communication and reward system of its discipline. The most striking aspect, however, is the amount of resources this society can mobilize, thanks to the symbiotic relationship of its leading élites with the chemical industry — in particular, with the big West-German Corporations. The GDCh plays a key role in the West-German science system. Its ideology and politics are accommodated (and cannot be much else) to its partner, the chemical industry, and legitimated by a functional-technical world view. Alternatives (for example, trade-union related approaches) are not taken up, or are explicitly rejected.

The Structure of the *Gesellschaft Deutscher Chemiker* (Society of German Chemists)

Rainer Rilling

To understand the social constitution of science and the process of its further differentiation, historians of science have devoted much attention to the foundation and development of scientific societies. The assumption was that these played an important role in the establishment of professional science and of national and international communication networks distributing scientific knowledge — as well as in the popularization of science, and in its becoming represented as part of the identity of emerging national bourgeoisies.¹

As a rule, the history of scientific societies is divided into three phases.² First is the seventeenth-century foundation of the 'classic' scientific societies, oriented also to realms of practice and with representatives of the newly-rising bourgeoisie among its members (prototype: the Royal Society of London). In the second phase, during the eighteenth century, disintegration and extensive loss of

function of these societies occurred, and societies of local or regional importance and amateur associations supplemented or replaced their function in the social system of science. The third phase is marked by three decades in the early nineteenth century, which saw the establishment of national societies such as the *GDNÄ* (*Gesellschaft Deutsche Naturforscher und Ärzte*) and the BAAS (British Association for the Advancement of Science), a movement originating in Germany and spreading throughout Europe. The national scope remained when, by the end of that century, the task of organizing the scientific communication process was taken over by disciplinary societies, emerging through differentiation of the nation-wide and science-wide 'mother organizations'. Laymen could, for the most part, no longer obtain membership of these disciplinary societies; this indicates how professionalism was increasing in science, and that these societies were also the organizational reflection of the formation of bodies of professional practitioners in science.

More recent developments of the various forms of scientific societies have been investigated to a far lesser extent, without any explicit justification of this neglect. In the German Federal Republic (FRG), for example, sociology of science has studied the development of numerous institutions and structures of the German science system, but no instance of the recent form of this particular institution with its rich tradition. Presumably, this lack of interest is to be explained by the assumption that scientific societies no longer play an essential role within national science systems. One could refer to the development of subdisciplinary organizations, and especially to the fact that central functions of communication and dissemination of scientific knowledge have been taken over by industrial and state institutions. All that remains for the scientific societies would be their internal role in the distribution of scientific recognition — for example, through the awarding of prizes.

Such a diagnosis, however, does not accord with the continuing importance of a scientific society like the *Gesellschaft Deutscher Chemiker* (GDCh) and the range of its activities. In addition, the following empirical analysis attempts to show that this society, at least, has an important function in establishing links between the social system of science and 'external' social environments, especially as a channel for social control. Although generalizations are not intended, one might well speculate about the possibility of

a new function of scientific societies becoming visible in the contemporary phase of the incorporation of science into society.

From the perspective of the sociology of science, the variety of scientific societies are all specific (goal-oriented and secondarily differentiated) organizational forms taken by the overall social incorporation ('*Vergesellschaftung*') of science.³ From the point of view of the sociology of organizations and voluntary associations, a distinction is made between professional organizations (with highly qualified members, for whom the content of their work is of overriding importance) and organizations that focus on the interests of members deriving from the economic form of the work in which they are engaged, independent of professional, legal or functional differences. Scientific societies belong to that end of the spectrum of organizations which focus on the cognitive side of the (scientific) work process. There are intermediary and transitional types — for instance, professional corporations and institutes, and scientific and professional trade unions.⁴ The *GDCh* can be classified as a scientific society with some additional tasks in representing the professional interests of its members. These are based on its members' substantial interest in the reception and utilization of the value of their expertise and work skills, and do not derive from the status of its members in the social division of labour (as is the case with white-collar unions), let alone from the opposition between capital and labour (as for industrial trade unions).

The Structure of the GDCh

Early History

The *Deutsche Chemische Gesellschaft* (German Chemical Society) was founded in 1867 on the initiative of the former president of the British Chemical Society, Augustus von Hofmann. The *Verein analytischer Chemiker* (Association of Analytical Chemists) followed in 1877, which through the efforts of Carl Duisberg was finally renamed in 1896 the *Verein Deutscher Chemiker* (Association of German Chemists), and became active as the professional association of chemists. Both organizations should, in von Hofmann's words, seal the alliance between science and industry. After World War I, other specialized professional-

chemical societies were established, including the *Emil-Fischer-Gesellschaft zur Förderung der chemischen Forschung e.V.* (Society for the Promotion of Chemical Research), the *Adolf-Baeyer-Gesellschaft zur Förderung der chemischen Literatur e.V.* (Society for the Promotion of Chemical Literature), and the *Justus-Liebig-Gesellschaft zur Förderung des chemischen Unterrichts e.V.* (Society for the Promotion of Chemical Education). These societies played a key role during the Weimar Republic in the management of funds, information flows and ideology, as well as in social control and socialization, in the rapidly developing chemical research outside private industry.

Under the Nazi regime, the *Deutsche Chemische Gesellschaft* and the *Verein Deutscher Chemiker* were made part of the *Nationalsozialistischen Bund Deutscher Technik* (National Socialist Federation of German Technology).⁵ After the war, since 1946 at the level of the zones of occupation and by 1949 at the level of the Federal Republic of Germany, the *Gesellschaft Deutscher Chemiker e.V. (GDCh)* was established in Munich. The charter of the society (which is legally based in Frankfurt) specifies its 'purpose of business' in §2 as:

The society's aim is the advancement, in the public interest, of chemistry and chemists. It seeks to achieve this through: 1. joint activities of all professional colleagues active in chemistry, as allowed by existing laws and regulations; 2. professional encouragement of members through lectures at central and regional meetings; 3. bringing together chemists working in special areas and the establishment of committees to work on important questions of the science and the profession; 4. promotion of further chemical education for young colleagues; 5. support of scientific work through the granting of scholarships; 6. promotion of chemical literature; 7. advice and mediation in all professional questions and provision of support for colleagues who have fallen into difficulty through no fault of their own, or for their dependents. Profit-making and other private economic goals are excluded.⁶

Membership and Finances

In 1960, the *GDCh* had 11,747 members, in 1970, 16,290 and in 1980, 18,107. Taking into account a student membership of around one quarter, the society can be estimated to have organized over two thirds of all West-German chemists with a university education at the beginning of the 1970s. Even if the degree of organization has fallen over the last decade, it must still be

regarded as extraordinarily high compared with other scientific societies. Data on the composition of the membership are not made public. Still, one may count on a somewhat lower representation of industrial chemists, compared with other groups of chemists. In addition, scientific institutes and industrial firms can be members; by the end of the 1960s, these comprised 2 percent of the membership.

In 1980, the membership fee amounted to 180DM annually for scientific institutes and libraries, 100DM for ordinary members and 18DM for students. Small firms pay 750DM, while the subscription from large enterprises is fixed individually. In addition, the chemical industry supports *GDCh* through voluntary donations, and there are non-chemical 'sponsoring' members. The budget of the *GDCh* has been published, in broad outlines, only since 1974. In 1980, it registered a revenue of 4,198 million DM, which drew 36.1 percent from members' subscriptions, 13.6 percent from journals, and 17.9 percent from 'non-specified sources' (in 1974, this was still 31.4 percent).⁷ Because the income is listed under several headings, which do not provide any details, it can only be estimated that around one quarter to one third of the revenue comes from industrial sources. Chemical industry directly finances *GDCh* journals and libraries, the *GDCh* job agency for chemists and physicists, to around one tenth of the activities of *GDCh* regional groups, and part (sometimes a considerable part) of the subscription to the International Union for Pure and Applied Chemistry (IUPAC). Government subsidies are small. There is no doubt that without industrial financing, the *GDCh* would not be viable.

Decision-Making Bodies in the GDCh

To a first approximation, the role of different groups can be traced through the composition of different decision-making bodies in the *GDCh*. In 1980, the executive Board of the *GDCh* consisted of fifteen members and two 'guests'. According to the statutes (§8), such honorary membership in the board should fall upon persons 'who have distinguished themselves by their achievements in the field of chemistry'. In the Board, the basic disciplines of chemistry, and the separate activities and sections of the society, should be represented; also, there should be a balance between persons with academic and industrial backgrounds. The President of the *GDCh*

should come alternately from academic research and from industry.

Apart from the earliest period, this rule for the President was followed. Of the sixteen *GDCh* Presidents between 1946 and 1986 (who all held honorary academic titles and three of whom [Ziegler, Kuhn, Lynen] were Nobel Prize-winners) nine came from universities or the *Max-Planck-Gesellschaft* (institutes for fundamental research) and seven from the chemical industry (five were President of the Board of Bayer, Hoechst or BASF, the three largest chemical companies in the German Federal Republic). All Presidents with industrial backgrounds were chairmen of the executive or supervisory boards, never representatives of industrial chemists or actual industrial research management.⁸ There is a striking assimilation in the reputational pattern: all industrial representatives held honorary academic titles, while almost all representatives from academic research were members of supervisory boards in the chemical industry.⁹ The President of the *GDCh* is automatically a member of the inner board of curators of the scientific foundation of the chemical industry, the *Fonds der Chemischen Industrie (FCI)*.

The composition of the *GDCh* executive committee between 1958 and 1980 (Table 1) demonstrates that, contrary to the idea of a 'balance' between academic and industrial representation, industrial members have managed almost to double their share between 1958 and the present day, and are also usually twice as strongly represented as those located exclusively in teaching and/or research institutions. At the same time, the number of committee members with both an industrial background and links to the academic, government-funded system increases. Further indications are that the Chairman of the Inner Board of Curators of the *FCI* (until 1980, this was Weissermel, from Hoechst) is represented on the committee of the *GDCh*, while, since 1949, a special addition to the constitution assures continuous industrial occupation of the central position of Treasurer.¹⁰

On the other hand, it is the university representatives who are predominant among the chairmen of the (currently forty-four) local associations, which organize 80–90 percent of the *GDCh* members in all the chief university and chemical industry locations. The proportion of industrial representatives, which remained the same between 1965 and 1974 (fluctuating between one fifth and one quarter) shows a tendency to diminish over the

TABLE 1 : Composition of the GDCh Board, 1958-80

Year	Background			Total number of Committee members
	University (incl. technical university)	Industry	(Number with honorary academic title)	
1958	5	6	(-)	12
1959	6	5	(-)	12
1960	5	6	(1)	12
1961	5	6	(1)	12
1962	3	7	(2)	12
1963	3	7	(3)	12
1964	3	7	(4)	12
1965	4	8	(3)	14
1966	4	8	(3)	14
1967	4	8	(3)	14
1968	4	9	(2)	16
1969	5	10	(5)	17
1970	6	10	(5)	18
1971	6	11	(5)	19
1972	6	10	(4)	17
1973	6	10	(4)	17
1974	4	11	(5)	16
1975	4	11	(5)	16
1976	5	10	(6)	16
1977	5	10	(6)	16
1978	5	10	(6)	16
1979	5	10	(5)	16
1980	6	9	(5)	17

Source: GDCh Annual Reports (1959-81).

last few years. In 1980, thirty-five of the forty-four local chairmen came from the academic sphere, the remainder mostly from the sphere of industry. The recent increase on the academic side is related to the establishment of new local associations, all in university locations. Only Krefeld (with the Bayer Central Laboratory), Leverkusen (Bayer Company), Ludwigshafen (BASF) and Marl-Hüls (Hüls) are important local associations which are always dominated by industry.

Of far greater significance is the role played by industry in the sections (*Fachgruppe*), which are far more important to the concrete day-to-day work of the society than are the local associations. The number of *GDCh* members organized in the current sixteen sections rose, between 1970 and 1980, from 25.5 percent to 40.8 percent. In 1980, just under half of the section chairmen were from the sphere of industry. At least six *GDCh* sections are practically only important for industrial research. Table 2 gives full details.

The overall importance of the role of chemical industry in the government of the *GDCh* can be assessed fully only when (in line with current organizational sociology) the actual policy and decision-making within the society is considered. If one looks at the general membership meetings in this connection, these appear to be marginal compared with the communication and science-political links already described.¹¹ Until 1974, the *GDCh* membership meetings had to accept the annual business report and elect the executive Board. As a rule, they were attended by scarcely 100 members; in 1974 there were only thirty-two (0.2 percent of members).¹² At membership meetings, no discussion takes place and there is no way for the membership to participate in decisions about society politics and personnel matters. From 1975 on, the Board, that, until 1969, had been elected without opposition candidates and 'unanimously through acclaim',¹³ was elected by a postal vote, in which almost two-fifths of the members took part.

As yet, members have not made use of their right to add to the list of candidates. The postal vote procedure serves mainly to ensure formal legitimation: the Board's right to nominate candidates obviously carries extraordinary weight by virtue of the organizational and capital power of its industrial members and the excellent scientific reputation of the scientists it represents. The continual election of representatives of specific industrial enter-

TABLE 2: Background of Chairmen of Scientific Sections of the GDCh, 1965-80

Year	Section										
	Analytical chemistry	Applied electro-chemistry	Paints & pigments	Solid state chemistry	Food & legal chemistry	Macro-molecular chemistry	Medical chemistry	Nuclear chemistry	Photo-chemistry	Detergent chemistry	Water chemistry
1965	BASF	Dynamit Nobel	Goldschm. A.G.	—	Pettenkoferin	—	—	Hoechst	—	—	various
1966	id.	id.	id.	—	id.	—	—	id.	—	—	various
1967	id.	id.	Bayer	—	id.	BASF	—	id.	—	—	various
1968	Univ.	id.	id.	—	id.	—	—	id.	—	—	various
1969	id.	id.	Titanges.	—	Nestle	Bayer	—	—	—	—	TU
1970	id.	id.	id.	Philips	id.	Hüls	—	Univ.	—	—	TU
1971	BASF	id.	id.	MPI	id.	id.	Univ.	id.	Univ.	—	TU
1972	id.	id.	id.	MPI	id.	id.	id.	id.	id.	—	TU
1973	id.	various	id.	TU	id.	id.	id.	Kft	id.	Procter	TU
1974	id.	various	id.	TU	id.	id.	id.	Kft	MPI	id.	Univ.
1975	id.	Dynamit	Bayer	Univ.	Univ.	id.	id.	Kft	MPI	id.	id.
1976	id.	id.	id.	id.	id.	id.	id.	Kft	MPI	id.	id.
1977	id.	Bayer	id.	id.	id.	Hoechst	Bayer	Kft	Univ.	id.	id.
1978	various	id.	Hoechst	id.	id.	id.	id.	Kft	id.	id.	id.
1979	various	id.	id.	Hoechst	id.	id.	id.	Kft	id.	id.	id.
1980	various	id.	id.	id.	id.	id.	id.	Kft	BASF	id.	id.

Legend: Univ. = University; TU = Technical University; MPI = Max-Planck-Institute; Kft = Kernforschungszentrum (the big government nuclear research institute); proper names are of big industrial companies; various = other background

Other sections cover a brief period only (Plastics & Rubber, 1965-67, chair from BASF; Semi-Conductor Chemistry, 1965-69, chair from university) or are less interesting for the main argument: Chemical Education, 1970-, chair from university; Independent/Consulting Chemists, chair 'various'; History of Chemistry, chair TU (1965-67), then 'various'; Corporate Law, chair from BASF (1965-69), Hoechst (1970-77), BASF (1978-79) and 'various' (1980); Nuclear Magnetic Resonance Spectroscopy, 1978-, chair from university.

Source: GDCh Annual Reports (1966-81).

prises demonstrates that personnel change at the top of the society is largely a process of self-recruitment and co-optation into a small, stable group of policy-makers. There are no procedures or practices to transmit the interests of the membership at large to the decision-making process, whether on marginal or on fundamental issues. The *GDCh* thus presents a picture that is thoroughly characteristic for professional organizations. The possibilities of defining the substance of the scientific policy of the society and of access to decisions are restricted to the representative bodies, the secretariat and to the only group that is represented on the Board (moreover by a majority) — the chemical industry. The plausible assumption, therefore, is that it is through the chemical industry that internal and external interests and activities of the society are mediated.

The Linkage Between the GDCh and Chemical Industry

In view of the original 'alliance between science and industry', it is not surprising that the relationships between the *GDCh* and individual industrial Corporations, the trade association *Verband der Chemischen Industrie* (*VCI*: Association of Chemical Industry) and its scientific foundation, the *FCI*, are unusually manifold.

The primary relationship is the direct representation of the chemical industry of West-Germany — which comprises the largest sectorial R&D effort in Europe — in the persons of prominent decision-makers on elected councils and administrative bodies of the *GDCh*.¹⁴ But the norm of balance in Presidential background, the special ruling for the post of Treasurer (continuously occupied by industrial representatives), the inclusion of the *FCI* representative in the Board's activities, and the continuity of representation of the same large enterprises in the councils of the *GDCh*, all lead to the unequivocal conclusion that the linkage between the two spheres is firmly institutionalized, not only in personnel networks, but also partly formalized. The reciprocal presence of the two top representatives (the Chairman of the Inner Board of Curators of the *FCI* on the Board of the *GDCh*, and the President of the *GDCh* on the Board of Curators of the *FCI*) symbolizes this linkage and publicly demonstrates its institutionalization.

Further, many scientists are represented in industrial bodies,

above all in the *FCI* and on the supervisory boards of industrial enterprises.¹⁵ Apart from the many personal contacts,¹⁶ hybrid roles (for example, industrialists as part-time university professors) play a part in the exchange between the spheres of science and industry.¹⁷ A more institutional coupling can be seen in industry actually taking over some of the *GDCh*'s functions;¹⁸ in the establishment of joint ventures in the area of information and documentation;¹⁹ and in the close co-operation in third-party associations and institutions, which derives from the key position of the *GDCh* in the domain of scientific and technical associations.²⁰ In addition, activities of the *GDCh* and (especially) the *FCI*, are designed along parallel lines and are thus functionally co-ordinated.²¹ Without the considerable financial contributions²² and further material support from the chemical industry, the activities of the *GDCh* as an organization could not be maintained.

It still remains to be demonstrated whether these close connections necessitate ideological and political accommodation — that is, ideological predominance in central issues, specifically the transmission of capitalist ideology into the realms of science. Altogether, the number, range and intensity of the relationships between the *GDCh* and the chemical industry makes it almost certain that autonomous determination of organizational aims by the academic membership of the *GDCh* is impossible — a fact to be expected, given the dominant position of the chemical industry in the West-German scientific system and its unparalleled influence on the universities.²³ In the relations between industry and the *GDCh*, it has exclusive control of material, financial and organizational resources of social power, and doubtless possesses the means by which it is both able and capable of exercising this power. To what extent the influence is manifest or only latent remains to be investigated.²⁴

The situation becomes even more significant if one takes the central position of the *GDCh* among the scientific associations and within the system of science-directing institutions into account: the *GDCh* represents West-German chemistry on an international and European level,²⁵ and is closely connected to the *Deutsche Gesellschaft für chemisches Apparatewesen* (*DECHEMA*: German Society for Chemical Apparatus/Technology)²⁶ and the *Deutsche Bunsengesellschaft für physikalischen Chemie* (*DBG*: German Bunsen Society for Physical Chemistry).²⁷ Further, the *GDCh* plays a dominating role in the *Deutscher Zentrallausschuss für*

Chemie (German Central Committee for Chemistry).²⁸ and a prominent one in the *Deutscher Verband Technisch-Wissenschaftlicher Vereine* (DVT: German Association of Technical-Scientific Societies).²⁹ Such collaborative links open up opportunities for access, communication and control, which extend far beyond the body of scientists directly represented by the *GDCh*.

The *GDCh* as a Professional Association

As indicated earlier, the *Deutsche Gesellschaft für angewandte Chemie* (German Society for Applied Chemistry) was founded in 1887 alongside the disciplinary society *Deutsche Chemische Gesellschaft* (*DChD*), and became the *Verein Deutscher Chemiker* (*VDCh*: Association of German Chemists) in 1896. It aimed at 'the development of the sense of professional standing among chemists and the representation of their interests in the life of our nation'.³⁰ The *VDCh* organized activities of vocational training, started to influence university chemical education and, from 1900 onwards, organized a private employment agency service for chemists. The *GDCh*, founded in 1946, saw itself as the successor organization to both *DChG* and *VDCh*. Thus, the *GDCh* is both a scientific society and a professional association. The dual nature of the society is one of the main determinants of its strong position within the science system. It has a direct access to the market for scientifically qualified labour, as it runs an employment agency for chemists and physicists (which is, in fact, financed almost completely by the *VCI*). This obviously unique arrangement has become much more significant since the mid-1970s.³¹ In recent years, on average, it serves over 700 job applicants per year. Being thus directly concerned with professional problems, the *GDCh* has always been involved with requirements of professional competence and with demarcation with respect to other professions — in particular, in relation to hygienists and medical and veterinary doctors. Despite the many efforts of the *GDCh* to obtain legal protection of the title of 'chemist', it has been unsuccessful in this traditionally central question of professional politics.

As the *GDCh* is not a socially homogeneous body, organizing in its membership employers and employees at the same time, it cannot negotiate for employment conditions, and it performs no

trade-union functions on the labour market to represent the economic interests of its various kinds of members. The *GDCh*, consequently, has no institutionalized relationship with the trade unions and labour movement in West Germany. In fact, it collaborates with organizations which are explicitly opposed to the trade unions.³² The *GDCh*'s interpretation of its membership rules can be seen in this context: they are directed against a 'levelling downwards' (General Secretary Fritsche), for which reason only graduates from universities or technical universities can become members of the *GDCh*, and not graduates from technical colleges (which include lower-level chemical engineers).³³

The *GDCh* as Organizer of the Scientific Communication Process

A focal point of the *GDCh*'s activity is also to be found, as with other scientific societies, in the sphere of the reproduction of scientific knowledge (education, information, communication).

Vocational Training

Particularly since 1969, the *GDCh* has been very active in the sphere of vocational training. Building on comparable BASF courses,³⁴ it addresses primarily industrial chemists; in 1972 these comprised 90 percent of the participants. The participation of non-academics rose to a notable high fraction of 23 percent in 1976. In the same period, the participation of non-members increased to an even larger share (40 percent) in 1980.³⁵ The number of courses rose from twenty-five (in 1970) with 873 participants to sixty-nine (in 1980) with 1,630 participants. Altogether, over 14,000 people have attended the educational courses of the *GDCh* since 1969. Through this the Society has succeeded in building up an attractive and central service within the infrastructure of the science system, as well as activating university chemists more towards the work of the *GDCh*. The big industries, which directly influence the work of the *GDCh* in this sphere of further education,³⁶ profit through the reduction in the cost of qualification for their employees (in 1980, two-thirds of participants still came from the industrial sphere).

Publishing

The *GDCh* has 90 percent control of the *Verlag Chemie* (Chemistry Publishing House), which had a turnover in 1978 of 32.5 million DM. In 1980 it published thirty-three professional journals, of which six were *GDCh* journals (seven in 1981).³⁷ The position that this publishing house occupies in the domain of natural science publications is a unique one — doubtless not only in Europe. Only one journal of national importance, *Zeitschrift für analytische Chemie* (Journal for Analytical Chemistry), is not published by the *Verlag Chemie*. Thus, there is on the publishing side a monopoly in chemical science publication. Through its control over chemical publications, particularly journals, the *GDCh* holds a very strong position *vis-à-vis* the knowledge production sphere of academic science, since the selective filtering function of scientific journals and their importance in the allocation of reputation and social status make them one of the most powerful institutions in science.³⁸

Documentation

The centrally important area in chemistry of documentation of scientific knowledge is served by closely intertwined activities of state institutions, the *GDCh* and industry, which have developed from the mid-1960s. The starting point was a joint venture by *VCI* and *GDCh*.³⁹ In 1967, a financial and collaboration contract was concluded between the *GDCh* and the *Internationale Dokumentationsgesellschaft Chemie mbH* (*IDC*: International Society for Documentation in Chemistry), in which eleven multinational corporations had joined forces.⁴⁰ The largest department of the *GDCh* (with about 100 employees) is the *Chemische Information und Dokumentation Berlin (CIDB)*, an activity which has developed since 1969 out of the editorship of the long-standing *Chemisches Zentralblatt*, and, since 1978, is no longer financed by the *GDCh*. This department publishes, among other things, the *Chemische Informationsdienst* (Chemical Information Service), jointly with Bayer A G; in 1976 it listed 19,195 abstracts or titles. Its importance can be inferred from the financial support given by the Federal Ministry for Research and Technology (*BMFT*), by the Society for Information and Documentation, and above all by the *FCI*.

In 1977, a reorganization took place in which the *Fachinformationszentrum Chemie* (*FIZ*: Scientific-Technical Information Centre Chemistry) was founded, after preparatory work by the *GDCh* and industry in the *Arbeitsgemeinschaft Chemie-Dokumentation e.V.* (Collaborative Company for Chemistry Documentation), established in 1968.⁴¹ The *FIZ* was supported by seven scientific societies, by the Federal Ministry for Science and Technology, and by the eleven industrial corporations (connected with a further 140 companies) which made up the *IDC*. Actually, the *IDC* had performed the functions of an *FIZ* until the end of 1978. With the newly formed *FIZ*, the possibility was created of 'central access to chemical and chemical-industrial information in the Federal Republic of Germany, collected in a wide range of locations'.⁴² Until then, it was the *CIDB* that had, to all intents and purposes, carried out the basic work of the *IDC*, and had assigned nearly two-thirds of its work potential to this task. The opportunity of privileged access, provided by the *GDCh/CIDB* to the *IDC* in their formation of the *FIZ*, led, even according to the Federal Ministry *BMFT*, to exclusive control of documentation by the large industrial corporations represented in the *IDC*, 'since the services offered by the *IDC* are not, in the view of the *BMFT*, oriented to all user groups — such as, for example, small business and fiscal authorities'.⁴³ Therefore, in 1980, the *CIDB* was commissioned to function as a government-financed *FIZ* for chemistry, independent of the *IDC*. The *CIDB* was dissociated from the *GDCh* in 1982, and developed into an *FIZ* receiving 80 percent government support, but also continuing its collaboration with the *IDC*. This means that, in contrast to the situation in journal publishing, the information monopoly is a collective one, carried by the private non-profit sphere (*GDCh*), the economic sphere (*VCI*, *IDC* and individual enterprises) and the government sphere. It is to be expected that the central, in a sense executive, role of the *GDCh* will diminish after the dissociation of the *CIDB*, even if informal relationships will continue to exist.

Reward System and Ideology

The distribution of scientific recognition, connected with the social reward system, plays a considerable role within the activities of the *GDCh*.⁴⁴ By the mid-1970s, 18 honours, prizes and medals, and the like, were awarded through the *GDCh*.⁴⁵ This kind of

formalized (and highly esteemed) scientific recognition, in the field of chemistry, can hardly be achieved without intervention of the Society. Of seventy honours awarded during the years 1970–78, fourteen went to scientists with industrial backgrounds, forty-five to academics and eleven to representatives of public institutions, independent of the universities. Even if the importance of this sort of allocation of scientific recognition for the social differentiation of scientific communities must be accorded less weight than is usually done in the sociology of science, still its control of a discipline-wide reward system makes the Society an indispensable, even if indirect, actor in the cycle of reproduction of scientific work.

Ideology — that is, an interest-related consciousness of the role of chemistry, the chemist and the conditions in which he works — is transmitted through the communication and reward systems. The activities of the *GDCh* in the ‘politics’ of ideology have increased considerably of late. Together with the public affairs activities of the Society (see below), the *GDCh*’s efforts towards the schools also play an important role. By 1981, the section (*Fachgruppe*) on chemical education had tripled in membership since its formation (in 1970, continuing the earlier *GDCh* working party on chemical education), the greatest increase being among chemistry teachers. Since 1973, vocational training courses have been offered for chemistry teachers (in 1980, thirteen courses with 345 participants). In *GDCh* publications these courses are attributed ‘a considerable importance for rational public affairs activities’.⁴⁶ The *GDCh* ascribes ‘particular importance to the further education of chemistry teachers: it is through their teaching that in the end the picture is moulded that the average citizen has of chemistry, that is, of the industries in question — above all the chemical industry — and of chemical science’.⁴⁷

The emphasis on the ideological or orientational function of the Society’s activities towards chemistry in the schools is correlated with its development of extensive public affairs activities, particularly since the mid-1970s.⁴⁸ Content analysis of the view of science presented in these activities shows a definite change compared with the mid-1960s. Questions about the application of scientific knowledge are now discussed: chemicals in medicine, in cosmetics, pesticides, environment protection, food.⁴⁹ The reflection on problems of application in *GDCh* publications has three characteristics. Firstly, the question is raised of the responsibility of the

scientist for the application of scientific results — but this is conceived of only as a problem concerning the personal attitude of the individual scientist and his/her individual action, independent of any social or organizational relations. Secondly, questions of application, when raised, are combined with a plea for a 'positive presentation of chemistry'.⁵⁰ Public activities must stimulate trust in science. The socio-economic and political side of the problems of impact of science is deleted; instead, the idea of 'value-free', 'neutral', 'objectively correct and ideology-free' science is cultivated, and the *GDCh* is conceived to be its advocate and representative.⁵¹ Finally, this concept of science entails a specific view of politics. Politics appears as normative, permeated with sectorial and group interests, and therefore partial, ideological, irrationally influenced and unscientific.⁵² Politics and science are sharply contrasted. It is to be noted, however, that there is not one statement by the *GDCh* characterizing the activity of the chemical industry as interested, not factual, ideological and unscientific. When the chemical industry is discussed, there is no talk of conflict, only of harmony. This notion of an unproblematic, tension-free coincidence of private-economic, scientific and societal interests is not based, as would be expected given the political position of most captains of industry, on an understanding of society according to liberal theories and concepts — claiming the natural and immediate equation of the innovativeness of the scientific enterprise with that of private ownership and free enterprise. Rather, the basic, although unexamined, idea of society is that of a network of functional, technical-instrumental relations in an industrial society, in which the relation between chemical science and chemical industry is also an instrumental one, and thus rational — which implies that interests can be seen as aligned unproblematically. On the other hand, trade unions (along with the political sphere) cannot be a part of this contradiction-free and functionally-integrated picture of society, as they are viewed as being one-sidedly ideological, interest-oriented organizations.⁵³

Concluding Remarks

In Ruske's official biography, the *GDCh* is presented as an autonomous society which establishes its aims and activities and

carries them out free from outside influences. With regard to other groups in society — industry, voluntary associations, government bodies — it can act without commitments. Such a picture of harmonious independence has been criticized in recent years by the sociology of science (which used to support such a picture itself), and a perspective based on power relations and élitist social structures operating in the science system and its institutions has been elaborated.⁵⁴ The conditions for such structures to emerge (and especially for their maintenance) have, on the other hand, been discussed only in passing, and the explanations offered tend to focus on processes within science. The example of the *GDCh* shows how the élitist structure is also reproduced in the organizational forms established in the science system. The study has further indicated that the self-preception, as officially formulated, of an autonomous society, does not correspond with the reality of the *GDCh*'s embeddedness in various science-external functional connections.

At one level of analysis, the close coupling between industry and the *GDCh* just reflects the long-established and well-developed interaction between science and production in the chemical domain. A political sociology of science, however, does not stop after establishing such a reciprocal relationship and its reflection in the organization of science, but analyses its asymmetric character — that is, the power differentials.⁵⁵ This should not be viewed simply as a question of one party pulling the strings. As the case study shows, it is a complex structure of personal and institutional linkages, functional co-ordination and parallel functions, with financial and material dependence on industry contrasted with a lack of participation of the Society's membership in decision-making.

On the one hand, the *GDCh* represents a notable continuity in the functional structure of scientific societies, for it contains all the basic elements of the pattern such societies developed in their constitutional phase at the end of the last century.⁵⁶ On the other hand, it has taken on further tasks (chemistry in schools, public affairs) and considerably intensified traditional ones (for example, vocational training). In the domain of reproduction of scientific knowledge, the *GDCh* has a central position. It can play its role only because of its being embedded in the big industries' management of chemistry. True, the *GDCh* plays only an indirect part in the economic process (apart from its ownership of the

Verlag Chemie). The *GDCh* is concerned with the cognitive side of the scientific labour process. The economic and cognitive aspects should, not, however, be seen as mutually independent.⁵⁷ This is clear from the role the *GDCh* plays in the appropriation, by private capital, of scientific work (at universities for example), and in the allocation of economic and non-economic resources going into it.

It is through this activity of appropriation that what Blume has analyzed as the system of social control in science is realized.⁵⁸ The *GDCh* plays a key role in this power structure — through its control over access to the scientific communication process and its modalities (education, publishing, documentation), through its influence on the labour market of highly qualified chemists, and through the maintenance of a social and scientific reward system. The *GDCh* does not carry out this role in an ideal scientific republic of equals, but in the concrete context of functional links with the big industries' science management, a context that is reflected in its organization.

In this paper, only the coincidence of structural and functional aspects has been demonstrated. But to show up the influence and social dominance of one party, the other not being in a position to evade such influence, it is not necessary to analyze goal-oriented actions of the powerful and/or the behavioural changes of those that are being influenced.⁵⁹ Such analysis is welcome, of course. But in view of the results of the structural analysis, it would be very surprising if statements or actions of the *GDCh* could be found which can be interpreted as opposition to the interests of industry (whether explicit [manifest] or latent, subjective or objective). There are many indications that such an opposition between structure and process indeed does not exist.⁶⁰ In the rapidly escalating conflicts in West Germany (particularly since the mid-1970s) about the social role and future of chemistry — conflicts between the chemical industry on the one hand and labour unions and citizen groups on the other — the *GDCh* has consistently taken the part of industry. It projects an interpretation of the role of chemistry and the chemist in society that corresponds, as far as one can see, to the philosophy of industry. Finally, it has at no time developed alternative conceptions about the organization of science, the politics of science and the nature and direction of chemistry, as compared to those put forward by industry and its interest associations. Neither has it made any

attempt to take over such conceptions from the social opponents of industry, let alone implement them. Since such alternatives have in fact been proposed and elaborated,⁶¹ this is one further reason to characterize the *GDCh* as an integral part of a specific, in fact capital-orientated, type of science.

• NOTES

The English text of this paper has been subedited by Arie Rip.

The *Tätigkeitsberichte* (until 1976 *Geschäftsberichte*) of the *GDCh* (the Annual Reports) will be cited as *Tb*, the *Nachrichten aus Chemie, Technik und Laboratorium* (News about Chemistry, Technology and Laboratory) as *NCT*. If no reference is given, data are from *Tb*.

1. See R. Gizycki, 'The Association for the Advancement of Science: an International Comparative Study', *Zeitschrift für Soziologie*, Vol. 8 (1979), 28–49; A. D. Orange, 'The British Association for the Advancement of Science: The Provincial Background', *Science Studies*, Vol. 1 (1971), 315–29; Orange, 'The Origins of the BAAS', *British Journal for the History of Science*, Vol. 6 (1972), 152–76; R. E. Schofield, *The Lunar Society of Birmingham* (Oxford: Clarendon Press, 1963); J. G. O'Connor and A. J. Meadows, 'Specialisation and Professionalisation in British Geology', *Social Studies of Science*, Vol. 6 (1976), 77–89; R. Stichweh, *Differentiation of Science: an Analysis using the German Example* (Bielefeld, FRG: University of Bielefeld, Science Studies Monograph No. 8, 1977), 182ff; F. R. Pfetsch, *Zur Entwicklung der Wissenschaftspolitik in Deutschland* (Berlin: Duncker & Humblot, 1974).

2. See Gizycki, op.cit. note 1; Pfetsch, op.cit. note 1.

3. D. K. Pfeiffer *Organisationssoziologie* (Stuttgart, FRG: Kohlhammer, 1976); S. Clegg and D. Dunkerley, *Organisation, Class and Control* (London: Routledge & Kegan Paul, 1980).

4. See R. Rilling, *Theorie und Soziologie der Wissenschaft* (Frankfurt, FRG: Fischer, 1975), 51ff; A. L. Strauss and L. Rainwater, *The Professional Scientist: a Study of American Chemists* (Chicago: Aldine, 1962); S. S. Blume, *Toward a Political Sociology of Science* (London: Collier-Macmillan; New York: The Free Press, 1974), 99ff; R. Moseley, 'From Avocation to Job: the Changing Nature of Scientific Practice', *Social Studies of Science*, Vol. 9 (1979), 511–22; R. and K. MacLeod, 'The Contradictions of Professionalism: Scientists, Trade Unionism and the First World War', *ibid.*, 1–32; Rilling, 'Die "Social Relations of Science Movement": Gewerkschaftliche Organisation und politische Linksorientierung in der britischen Wissenschaft 1917–1945', *Das Argument*, Vol. 23 (1981), 29–47.

5. See W. Ruske, *100 Jahre Deutsche Chemische Gesellschaft* (Weinheim, FRG: Verlag Chemie, 1967); H. Etzold, *Monopol und Wissenschaft* (unpublished dissertation, TU Dresden, 1970); H. Reishaus-Etzold, 'Die Herausbildung von monopolkapitalistischen Lenkungsorganen der Wissenschaft während der Weimarer Republik unter dem Einfluss der Chemiemonopole', *Jb. f. Wirtschaftsgeschichte*, Vol. 13 (1972), 13–36; E. Schmauderer (ed.), *Der Chemiker im Wandel der Zeiten*

(Weinheim, FRG: Verlag Chemie, 1973), 311ff; see also H. Mehrtens and S. Richter (eds), *Naturwissenschaft, Technik und NS-Ideologie: Beiträge zur Wissenschaftsgeschichte des Dritten Reiches* (Frankfurt, FRG: Suhrkamp, 1980).

6. *Minerva Jahrbuch* (1972), 27. See also the first two studies on the subject by I. Klenke, *Die Gesellschaft Deutscher Chemiker (GDCh)* (unpublished DipSoc, University of Münster, 1977); R. Strüh-Peter, *Die Gesellschaft Deutscher Chemiker (GDCh) e.V.: Soziologische Analyse einer 'scientific community' im Wissenschaftssystem der Bundesrepublik Deutschland* (unpublished DipSoc, University of Marburg, 1978).

7. The additional donations often given by individual firms are registered under 'membership contributions', singular and activity-related contributions under 'special proceeds'; non-specified resources form an increasing proportion of the budget. See *Tb* (1975), 319: 'Thanks are due as ever to the firms in the chemical industry, which help to support the financial basis of the *GDCh* through sometimes voluntary contributions'. Also *Tb* (1970), 84: 'The traditional collaboration between the *Verband der Chemischen Industrie (VCI)* and the *GDCh* was continued in the year under report. It covered, first, the effective financial support, by the *Fonds der Chemischen Industrie (FCI)*, for the activities of the *GDCh* in the area of information and documentation, without which the activities of the *Chemische Informationsdienst* (which in 1970 replaced the *Chemische Zentralblatt*) could not have been realized. Apart from this, the *FCI* also provided the means for the Adolf-von-Baeyer-Library of the *GDCh* to purchase current journals and to add essential monographs. The *VCI* also played a considerable role in meeting the costs of the *GDCh*-department *Vermittlungsstelle für Chemiker und Physiker* (the employment agency for chemists and physicists). From joint funds for travel grants, the *FCI* and the *GDCh* were able to visit scientific congresses and symposia in the BRD'. On the subject of financial support of the *GDCh* by the chemical industry, see also *Tb* (1958), 31; (1959), 39; (1963), 58, 62; (1964), 25; (1965), 61; (1966), 64; (1969), 80ff, 92; (1970), 84; (1971), 298; (1972), 358; (1973), 314; (1976), 315; 317; and *NCT* (1975), 532.

8. See Strüh-Peter, op.cit. note 6, 203ff. The position of President of the *GDCh* has been held by:

- 1946–51: K. Ziegler (Max-Planck-Institut).
- 1952–53: W. Klemm (University of Münster).
- 1954–55: U. Haberland (Bayer).
- 1956–57: B. Helferich (University of Bonn).
- 1958–59: C. Wurster (BASF).
- 1960–61: E. Wiberg (University of Münster).
- 1962–63: K. Winnacker (Hoechst).
- 1864–65: R. Kuhn (MPI).
- 1966–67: H. Ley (Metallgesellschaft).
- 1968–69: H. Bredereck (University of Stuttgart).
- 1970–71: B. Timm (BASF).
- 1972–73: T. Lynen (MPI).
- 1974–75: K. Hansen (Bayer).
- 1976–77: O. Glemser (University of Göttingen).
- 1978–79: E. Biekert (Knoll Ag/BASF).
- 1980–81: G. Wilke (MPI).

9. See *VCI, Yearly Report* (1979–80), 1; (1980–81), vi, xxxff.

10. According to §9 of the statutes, unlimited re-election is possible here (in contrast to all other positions on the Board!). This led to the position of Treasurer being held from 1949–56 by Kuss (Chairman of the Board of the *Duisburger Kupferhütte*), from 1957–60 by Winnacker (Hoechst), from 1961–70 by Schackmann (*Duisburger Kupferhütte*), 1971–75 by Sammet (Hoechst), and 1976–80 by Hellmann (Hüls). *Ex officio*, the Treasurer is also a member of other councils: the controlling board of the *Chemiker-Hilfskasse* (Chemists' Relief Fund); of the *Chemische Informationsdienst* of the Gmelin Institute for Inorganic Chemistry; and also in the *Verlag Chemie*. See *Tb* (1970), 16.

11. The General Meetings, which take place biannually, are usually combined with honorary meetings, celebrations of jubilees, banquets and section meetings. In 1979, 1,600 participants attended, in twenty sections, a total of nine plenary sessions, sixty-two main lectures, and 233 papers. The annual chemistry lecturers' conferences are also important: in 1980 they were attended by 380 university lecturers.

12. See *NCT* (1974), 487.

13. See *Tb* (1969), 9, 19ff. This was the standard formulation in the business reports of the 1950s and 1960s. The changes in the mode of election had the aim of 'giving the individual member of the *GDCh* the feeling [!] of having more influence over the composition of the Board': *NCT* (1970), 220.

14. A few examples: Balke was Vice-President of the *VCI* while a member of the *GDCh* Board; Winnacker, President, Treasurer and Board member of the *GDCh* of many years' standing, was *VCI* President; the co-founder of the *GDCh*, Bayer, was Chairman of the *VCI*'s Board of Curators of the *FCI*; Henkel, in 1966–69 a *GDCh* Board member, was at the same time a member of the *VCI* praesidium; the same holds for Sammet, who was a Board member and, until 1975, Treasurer of the *GDCh*; Wurster, who was active on the *GDCh* Board in various functions, was likewise a *VCI* member; Steinhöfer, for many years the Chairman of the Inner Board of the *FCI*, and of the *VCI* working party on science policy, was also a Board member of the *GDCh* for many years; Weissermel, his successor in the *FCI* until 1980, and similarly a member of the *VCI* working party for science policy, has been on the *GDCh* Board for years; and Timm, of the *VCI* praesidium, and Hansen, a one-time *VCI* President, belonged to the *GDCh* Board for as many years as Bieker (of the *FCI*).

15. Positions on supervisory boards, for example: von Lynen with Hoechst; Wilke with Hüls; Bredereck with Cassella-Hoechst; Becke with Bayer; and, with the *FCI* or the *VCI*, Fritz, Nöth, Quinkert.

16. 'With the sector on research and vocational training [of the *VCI*], whose director, Dr Hoffmann, also manages the affairs of the *FCI*, there are naturally very many contacts': *Tb* (1959), 40. 'The *GDCh* has been able to obtain relevant advice on specific problems from competent experts of the Chemistry Association, and has answered questions of the Chemistry Association based on its own expertise': *Tb* (1961), 43. There is regular co-ordination between the directors: see *Tb* (1974), 27. The secretariat of the *GDCh* was originally located in the 'House of Chemistry' of the *VCI*, which, according to *Tb* (1958), 32, 'had a fruitful effect on the collaboration' (the more so because of a reduction in lease payment). The move to the Carl-Bosch-House in 1962 did mean the loss of the 'close daily contact with the management of the Association of the Chemical Industry' [!]; however, the 'friendly collaboration over mutual problems and the tradition of mutual advice has

in no way been disturbed': *Tb* (1962), 47. In the mid-1970s, about thirty employees worked in the secretariat of the *GDCh* in Frankfurt.

17. See also R. Schmidt, 'Die Bedeutung der Hochschulen für Fortschritt der chemische Industrie und die Herausbildung des Nachwuchses', in *VCI* (ed.), *10 Jahre Fonds der Chemischen Industrie* (Dusseldorf, FRG: *VCI*, 1967), 27: 'That industrial research and academic research are dependent on one another, is apparent from the fact that in no other branch of industry do so many high executives also teach in universities as in the chemical industry'.

18. See *Tb* (1974), 270: 'The *GDCh* Board decided during the year under review to intensify the society's public affairs activities from 1975 onward, and in this connection to make use of the possibilities and experience of the public relations office of the Association of the Chemical Industry. The director of this *VCI* office will manage the *GDCh* public relations office as a free service'.

19. See the section on Documentation, below.

20. See Strüh-Peter, op.cit. note 6, 109ff; also Klenke, op.cit. note 6, 105.

21. Note, in particular, the *FCI* activities toward students, scientific literature and research.

22. See the examples mentioned in *Tb* (1969), 76, of support provided by individual chemical corporations. This extends to the reward system organized by the *GDCh*. Over half a dozen of the distinctions awarded by the *GDCh* are initiated and financed by industry. It is also represented on the corresponding authorizing councils: see *Tb* (1970), 10. The *GDCh* functions here as a branch office, of high standing, of private enterprise, the patron: 'The Board', we read in *Tb* (1970), 10, 'decided to accept the foundation for the Herman-Staudinger-Prize, and agreed to the foundation's charter, as it was passed by the Board of Directors of BASF'.

23. The former director of the research department of Hoechst stated in 1970: 'There are, thank God, no industries and no academic sectors in the whole of Germany which have collaborated better for decades than the Chemical Industry': *NCT* (1970), 91. The representative of the *FCI* on the *GDCh* Board said of the activities of BASF in 1966: 'Four hundred lectures and specialist meetings were held at universities and technical universities last year by scientists from BASF alone. In the other direction, practically every week a university researcher would come to present his work to us': *Die Basf* (1966), 127. See also T. Höpner, 'Kooperationsbeziehungen zwischen Hochschulen und der Industrie', *Gewerkschaftliche Monatshefte*, Vol. 28 (1977), 95.

24. See S. Hradil, *Die Erforschung der Macht* (Stuttgart, FRG: Kohlhammer, 1980), 39ff.

25. The *GDCh*, through the *Deutschen Zentrallausschuss für Chemie* (German Central Committee for Chemistry), which comprises thirteen organizations in the chemical sector, represents West-German chemistry in the International Union for Pure and Applied Chemistry (IUPAC), and organizes IUPAC congresses in the BRD. The secretariat of the Federation of European Chemical Societies (FECS), for Western countries, is held by the *GDCh*.

26. The collaboration involves documentation, further education, curriculum reform, and publishing activities. The Boards and offices of the *GDCh* and of *DECHEMA* (also linked by many personal ties) work in close collaboration: see *Tb* (1966), 67.

27. Among the twenty-two committee members of the *DBG* there were nine

industrial representatives in 1977 from the firms of Bayer, VEBA, BASF, Hüls and Hoechst. 'None of these needed to be personally active in scientific research. This, therefore, is not their function on the committee of the Bunsen Society': Höpner, op.cit. note 23, 99. From 1965 until 1967, the first Chairman of the *DBG*, Steinhöfer, was also Chairman of the Inner Board of the *FCI*, and therefore represented on the *GDCh* Board. Sammet and Franck, who were for many years with the *GDCh*, as President or Board member, were also on the *DBG* committee. The bureaux of both organizations are located in the same (Carl-Bosch) House, and the *GDCh* bureau makes its services available for use by the *DBG*: *Tb* (1980), 497. The *GDCh* also represents *DECHEMA* and the *DBG* on the General Committee for Technology (*Gdt*), whose Chairman is the former Treasurer of the *GDCh*, Schackmann: *Tb* (1980), 500. The Director of the *GDCh*, Fritsche, has been in charge of the working community of Professors of Chemistry at Universities and Technical Universities in West Germany (*ADUC*) since 1970.

28. The German Central Committee for Chemistry unites all the scientific, technical and economic organizations in the chemical sector in West Germany (*VCI*, *GDCh*, *DECHEMA*, *ADUC*, *DBG*, and so on). In 1978, the President was the former *GDCh*-President, Brederick; the Director is Fritsche (*GDCh* Director).

29. The *DVT* comprises eighty-seven scientific and engineering associations of West Germany. On the *DVT* Council, see *Tb* (1959), 41: 'In this Council, it can be noted that the *GDCh* has a position not achieved by many other technical-scientific associations, because in chemistry it is natural to have close collaboration between universities and industry, and because of the chemical industry's willingness to support, and its general promotion of, chemical science'. This position is further described in *Tb* (1976), 347: 'The *GDCh* is closely associated with the work of the *DVT*. Among the members, past and present, of the *DVT* Council are: Professor S. Balke, Munich, as President of the *DVT*, *GDCh* former President Professor Dr H. Brederick, Stuttgart, as representative of the *GDCh* on the *DVT* Council, and the former *GDCh* Treasurer Professor Dr H. Schackmann, in his capacity as President of the Committee for Technology'. The *GDCh* Director always attends the *DVT* Council meetings as a guest.

30. Ruske, op.cit. note 5, 26.

31. See *NCT*, Vol. 9 (1961), 105: 'It is the only non-commercial employment service which, commissioned by the highest employment authority, mediates for chemists, physicists and chemical engineers'. The *VCI* carried approximately five-sixths of the costs of the employment service in 1980.

32. Of particular importance here is the *Verband Angestellter Akademiker* (*VAA*: Association of Employed Academics), which is a division of the *Union leitender Angestellter* (*UIA*: Union of Executive Employees), and organizes, with about 14,500 members, nearly two-thirds of all scientists in the chemical industry, according to its own statements. The majority of industrial chemists with degrees are therefore organized, at present, both in the *GDCh* and in the *VAA*. Requests that the *GDCh* should be involved in salary matters are rejected, for instance, in *NCT*, Vol. 11 (1969), 174; (1974), 490.

33. See Strüh-Peter, op.cit. note 6, 107ff.

34. See *Tb* (1969), 15; *NCT* (1968), 224.

35. See *Tb* (1980), 484.

36. Weissermel (Hoechst, *FCI*), is the Chairman of the *GDCh* commission for

courses in further education: see *Tb* (1973), 307. In 1980, 630 lectures were given in the forty-four local associations.

37. The journals of the *GDCh* are: *Angewandte Chemie*; *Chemische Berichte*; *Liebigs Annalen der Chemie*; *Chemie-Ingenieur-Technik*; *Nachrichten aus Chemie*; *Technik und Laboratorium*; *Chemie in unserer Zeit*; *Journal of Chemical Research*.

38. J. Kurucz, *Industriephysiker und Industrieherrn* (Saarbrücken, FRG: Selbstverlag, 1975), 6ff, tells how the corporations BASF, Hoechst and Bayer attempted, via the *GDCh*, to prevent the publication, in *Verlag Chemie*, of his 'unexpectedly' critical examination of the position and consciousness of the chemists. On the problem in general, see D. Lindsey, *The Scientific Publication System in Social Science* (San Francisco, Calif., Washington, DC, and London: Jossey Bass, 1978), 10ff.

39. In 1965, the *VCI* and the *GDCh* jointly established a 'Study Company for the Promotion of Chemical Documentation' (*Studok*), aiming to adapt chemical literature to forms suitable for data processing. The research work was financed by the *FCI*, individual firms in the chemical industry and the Volkswagen Foundation, and was carried out by private and industrial institutions. Around the mid-1960s, eleven European chemical firms had already combined to form a patent documentation group. A working group, to which BASF, Bayer and Hoechst belonged, had the task of encoding the literature and patent rights of low-molecular chemistry, and storing them in an electronic database: see *NCI* (1966), 361.

40. See *Tb* (1975), 351; (1976), 339. Members are, among others, BASF, Bayer, Hoechst, Hüls, Degussa, Dynamit Nobel, Henkel, Ruhrchemie, Wacker, Oesterreichische Stickstoffwerke, Nederlandse Staatsmijnen.

41. Members were the Beilstein Institute, *DECHEMA*, Forschungsgesellschaft Kunststoffe, *GDCh*, Gmelin Institute, *IDC*, Pharma-Dokumentationsring and *VCI*. Until 1975, it was directed by the *GDCh*, then by the *IDC*.

42. *VCI* (ed.), *Jahresbericht 1976-77* (Frankfurt, FRG: *VCI*, 1977), 90.

43. *Tb* (1979), 504.

44. A survey of the extensive literature on this question can be found in M. J. Mulkay, 'Sociology of the Scientific Research Community', in I. Spiegel-Rösing and D. J. de Solla Price (eds), *Science, Technology and Society* (London: Sage, 1977), 93-148.

45. See *Adressbuch Deutscher Chemiker 1977/78* (Weinheim, FRG: Verlag Chemie, 1977), 25ff; *Tb* (1979), 473ff; (1980), 460.

46. *NCT* (1980), 915.

47. *NCT* (1979), 729.

48. In October 1980, the *GDCh* press office was changed into a section for public affairs activities, and its funds quadrupled from 28,000DM (1979) to 112,000DM (1980). In 1980, also, a prize for journalists and writers was established. It is awarded for 'especially positive presentation of Chemistry' [!]: *Tb* (1980), 456, 460.

49. See Strüh-Peter, op.cit. note 6, 133ff, 161ff.

50. See also *NCT* (1980), 63.

51. See *NCT* (1980), 911: the *GDCh* has the 'definite advantage that it cannot be regarded as an interest association, but as a scientific society which takes a neutral standpoint'.

52. On the view of politics, as expressed by the *GDCh* Director in 1971: 'Chemists must appreciate and value that the state relies on their technical advice

so that decisions which are factually correct and not emotionally influenced can be reached': W. Fritsche, 'Der Chemiker in unserer Zeit', in Schmauderer (ed.), op.cit. note 5, 339.

53. See the confrontation between *GDCh* and *VCI*, on the one side, and the industrial trade union, *Chemie-Papier-Keramik*, on the other, over questions of the reform in the study of chemistry: see *NCT* (1980), 149.

54. See M. J. Mulkay, 'The Mediating Role of the Scientific Élite', *Social Studies of Science*, Vol. 6 (1976), 445-70.

55. See S. Lukes, 'Power and Authority', in T. Bottomore and R. Nisbet (eds), *A History of Sociological Analyses* (London: Heinemann, 1979), 633-76; W. Hofmann, *Stalinismus und Antikommunismus: Zur Soziologie des Ost-West-Konflikts* (Frankfurt, FRG: Suhrkamp, 1967), 13ff.

56. See Ruske, op.cit. note 5, 40ff.

57. See Rilling, op.cit. note 4, 9ff.

58. See Blume, op.cit. note 4, 63ff.

59. Hradil, op.cit. note 24, 22.

60. On the following, see also *Tb* (1980), 912; and *NCT* (1980), 213, 149, 303; (1979), 729; (1981), 683.

61. On the concept of 'worker-orientated science', which is developed as a specific, social-interest related type of science in West Germany, particularly by the trade unions: S. Katterle and K. Krahn (eds), *Wissenschaft und Arbeitnehmerinteressen* (Köln, FRG: Bund, 1980); idem, *Arbeitnehmer und Hochschulforschung* (Köln, FRG: Bund, 1981).

Rainer Rilling is Privatdozent at the Institute of Sociology, University of Marburg. He has published on Theory and Sociology of Science: *Theorie und Soziologie der Wissenschaft* (Frankfurt/M., FRG: Fischer, 1975) and on military research in the USA and FRG. Since 1983 he has been co-editor of the *Informationsdienst Wissenschaft und Frieden*. He is currently working on the extension of military controls to scientific communication in the United States. *Author's address*: Institut für Soziologie, Philipps-Universität Marburg, Wilhelm Röpke-strasse 6, D-3550 Marburg, FRG.