Tunisian Science in search of Legitimacy

François Siino

TUNISIAN SCIENCE IN SEARCH OF LEGITIMACY

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Tunisia's scientific system can be pictured as the contradictory result of a State discourse prescribing the construction of a national science to serve development and the largely successful transplantation of the most academic elements of the French system of the 1960s and 1970s. The mixture of these influences is bound to historical factors which will be touched on further in this paper. It has made Tunisian science a theatre of paradoxes, sources simultaneously of strengths and weaknesses.

Strengths lie in the fact that this process has generated representations, held by the researchers – constructed around certain values imbued from public sector research, international collaboration and excellence. Most of the scientific community in Tunisia sees itself as being invested with a mission: the reliable production and transmission of knowledge, whose continuity in the long term must be ensured. These representations have no doubt helped Tunisian research overcome the many trials and tribulations of its short history. However, weaknesses intervene, in that the general context of this process has not for the moment led to the emergence of any sources of legitimacy for scientists than those the political powers –and to a degree international aid- are willing to give it, by means of what are sometimes contradictory initiatives.

In spite of a potential which is certainly substantial with regard to comparable countries, Tunisian science therefore remains a precarious edifice, particularly so in the context of economic decisions which might have far-reaching consequences.

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1. A CASE OF DISCOURSE OF THE SOUTH BUT SCIENCE OF THE NORTH ?

Ever since independence, science in Tunisia has been an affair of State. It features large in the discourse of the political elite. And first and foremost in proclamations made by President Bourguiba. This president claimed explicitly the inheritance of reformist thinkers of the XIXth century, who saw in the reappropriation of the "profane sciences" (*hikmiyya*) one of the conditions for Tunisia's survival as a nation. With a judicious mix of modernist discourse and references to tradition, the head of State hammered out the message that "strength, at this moment of history, lies in science. Teaching our fellow citizens the scientific disciplines constitutes a chapter of the *Jihad*".[1] The message he was trying to drive home to his people is that science is at one and the same time the source of economic development, the guarantee of a just government -because it is "rational"-. It is a culture of modernity that could emancipate the whole of the people and also the outer wall that would protect a still fragile independence.

Showing through this statement of humanist faith in favour of progress was, however, a sense of urgency and of the need to move swiftly. Tunisia is a poor country, confronted by a host of concrete problems, so when he describes his thoughts on the type of science the country needs, Bourguiba explains that "it is not a science in the absolute, a question of knowledge as opposed to ignorance, or of simply satisfying intellectual curiosity which is certainly legitimate but often unproductive; it concerns applied science and technical disciplines".[2] This so-termed "concrete" science, in the spirit of the leaders of the time, is the one which will lead unfailingly to "development".. On this point of view, in fact, we are not very far from the concepts which prevailed during the era of the French protectorate, where colonial discourse and scientific discourse intermingled on the theme "increasing the Empire's potential"..[3] This is of course in unison with the approach of United Nations bodies –especially UNESCO- which spread throughout the Third World countries the idea that science was for the developing countries a favoured route for catching up.

Transposition of the French academic model

However, such proclamations about a "concrete" science geared to serving development had only a very slight influence on the way Tunisian academic science was to build up after 1960 and on the steady flourishing at its core of a certain way of doing scientific research. In reality it was the French model which was to leave its mark deeply and durably imprinted, owing to the strong relations linking Tunisia and France and to the intensity of the links which were to be established in order to train young Tunisian scientists, This was the French system in which –in the 1960s and 1970s- scientific research was in full expansion and where the dominant values were those of freedom to pursue chosen lines of research, theoretical excellence, values espoused for example by Pierre Jacquinot, renowned physicist and director general of the CNRS from 1962.[4]..

In 20 or so years, this mould was systematically going to shape the first generations of Tunisian scientists. At this time, France had almost a monopoly on training. In the 1960s France allotted young Tunisians as many grants as their own government (over 600 per year). In 1970, France was host to just over 80% of the Tunisian students who had received grants to study abroad. Most of them went for long stays (between three and ten years), the time for a doctoral thesis or, more commonly, a *thèse d'Etat*.. It was therefore in French universities and

[1] - Carthage speech, 25/01/1973.
[2] - Speech of 7/11/1955.
[3] - On this aspect see Christophe Bonneuil (1991).
[4] - See Picard (1990, p. 209 and following pages). Research programmed on defined objectives did exist at the time, but it was implemented within agencies like the CEA or the CNES.

laboratories, under the supervision of French professors and in the company of French peers, that nearly all the future Tunisian university teacher-researchers acquired their training.[5]

The French mould was to be all the more effective in that it worked its influence on young people who generally did not know exactly what line they wanted to follow. Contrary to what might have been anticipated from President Bourguiba's proclamations on the country's "urgent needs" and on the answers that science could (and must) bring, no particular direction had been fixed for them. From that time, the French model was in play as it were by default : as the young Tunisians who went for training in France had been selected from among the best of their country, they obtained very good results in the French universities. This excellence was to contribute to their orientation towards the more "theoretical" research fields (that is to say, the most prized, in terms of French academic criteria of the time) where they would obtain experience mainly in the most fundamental kind of science. Once back in their country, they tended to reproduce the model which had been the source of their socialization, with a predilection for the theoretical and fundamental aspects most developed and valued by international science standards. Research, with support from government sparse, remained above all perceived as belonging to a particular moment in an academic career, the preparation of the thesis, which leads to a degree and prerogatives associated with it. Beyond that, it is an attribute of academic power (that of "professors"), translated in concrete terms by the "possession" of a laboratory and organized according to a hierarchical division of labour. The fledgling Tunisian academic research found itself fragmented: it was conducted in a highly individualized way in small teams shut off from each other, jealous of their material and of their contacts abroad. It was in fact international aid (and especially French) which was the main source of recognition. It was this which supplied rewards, both material and symbolic, and which continued to train in the same fields the new generations of students.

It was the era when the "large faculties" triumphed (those founded from 1960 onwards, most of which were in place around 1975). Their legitimacy lay in the number of students trained by young professors who very quickly reached the highest grades. Indisputably, they constituted the centre of the whole system, with weighty institutions like the Faculty of Sciences at Tunis and the Faculty of Letters. In 1970-71, these two alone brought together 49% of students and 44% of all higher education teaching staff. More on the edge of the system, technical or technological institutions like the National Agronomic Institute of Tunis, heir of colonial agronomic institutions, the National School for Engineers of Tunis (ENIT) or the *Ecole Normale Supérieure d'Enseignement Technique* (ENSET) founded relatively late on in 1969 and 1973. These suffered for a long time from students' disaffection for the technical disciplines.

Finally, some other centres were clearly consigned to the margins. These were rare, small institutions of research-development like the Institute for Scientific and Technical Research (IRST), founded in 1969 by the amalgamation of a Centre for Arid Zones and a rather improbable Atomic Energy Authority (CEA).

2. A SCIENTIFIC FIELD TORN APART

It was precisely these peripheral institutions which, from 1978, called radically into question the way academic science was conducted in universities. In the first instance, this questioning was initiated by a new reform-minded Director of Scientific Research who, taking up on his own account the discourse on "a national science in the service of development", criticised the

[5] - Not to mention that there were many who began their studies in the recently created Tunisian undergraduate courses under the rule of French teachers on assignment in Tunisia for aid schemes.

academicism of Tunisian scientific research and intended henceforth to favour research organized in definite programmes, fixed on particular objectives and conducted in research centres outside the university system.

Attentive to this new discourse, a minority group of scientists demonstrated their support for what they perceived as the opportunity to put right an injustice. Brought by the chance of their respective careers to work in applied research institutions (notably IRST and INAT), these researchers felt they were marginalized and despised by an academic system mainly turned towards fundamental research.

The new Director of research, strong in the benevolent indifference of his minister-, brought the political impulse, the scientists themselves supplying the technical support of their respective specialities (physics, chemistry, biology and geology for those most involved). Together they therefore endeavoured to impose their leadership and a new picture of science, one embracing a concept of research devoted first and foremost to solving the concrete problems which were the stumbling blocks of development in Tunisia. The first priorities they identified were the fields of renewable energy, development of the country's natural resources (primarily phosphates), water resources and supply and marine sciences for their applications in fisheries.

They wanted to equip themselves with their own facilities, distinct from the universities. Starting from the modestly-sized Institute for Scientific and Technical Research (only 10 researchers and three disciplines represented in 1977), they built up an ambitious research campus with seven centres,[6] renamed the National Institute for Scientific and Technical Research. By 1984 it comprised 53 researchers covering 9 disciplines. In that same period the overall budget for the institution, excluding salaries, increased by 3.5 and the constituent centres received besides that funding for special budget lines, the National Research Programmes (PNR) which matched the priorities the new research leaders had defined.

In order to place on a firm base the political network of decision-making they had elaborated, they set up a national-scale coordinating body, the Scientific and Technical Research Council (CRST). They arranged for the key posts to be reserved. Next they succeeded in attracting the interest not only of French scientific aid but also of more hefty donors such as the European Union and certain United Nations agencies, attracted by the projects which were concrete and "visible".

From the very beginning, this strongly determinist policy came up against the hostility and fervent opposition of the great majority of Tunisia's university scientists. They perceived it as a serious questioning of their way of doing science, carrying a threat of downgrading. These academics (and especially those holding power in the universities) put up a defence which called on the values of scientific competence, the independence of research and the unity of science. They refuted the distinction between fundamental research and applied research (implying thereby the primacy of the fundamental science upstream of its applied form, in line with a classical linear model). They were critical of a "would-be science to serve development" which, according to them was no more than a vague form of technology transfer. They tried above all to discredit the partisans and promoters of that science.

The issues at stake in this conflict are partly symbolic: which of the combatants involved were the trustees of the legitimate science ? These issues were also evidently political and economic in nature, because the long-term ability to decide national strategies for science and to tap public money, as well indeed as funds from international scientific aid, depended on this scientific legitimacy.

[6] - Centre for Applied Chemistry, Centre for Physics and Energy Studies, Centre for Biology and Genetic Resources, Centre for Earth Sciences, Centre for Biotechnology, Centre for Water Science and Technology, Centre for Oceanology.

This furious clash between two camps which were a priori irreconcilable in fact cut across a problem of generations. The new policy for programmed research stimulated the interest of a number of young qualified scientists, candidates for entering the system. They were particularly interested by the possible setting-up of a body of researchers distinct from the corps of teachers in the university faculties. They saw in it the possibility of avoiding the difficulties which seemed inevitably to spring up in the course of their career. In 15 or so years, the Tunisian university system in fact changed radically. At the beginning (the 1960s) conditions were such that qualified young scientists were still rare and were immediately snapped up by the system to fill as quickly as possible the "virtually free" posts of foreign aid agencies. Then the university became largely well doted with senior staff and continued unabated to produce each year increasingly numerous cohorts of graduates (at the beginning of the 1980s). Recruitment became more and more rare, working situations at university became marked by increasingly tough competition; for the few who were taken on, the pace of their career advancement, strictly controlled by the "professors", was nothing like that which had been experienced by the previous generation. Therefore the research sphere appeared more likely to reproduce the conditions for a swifter rise up the career ladder. Which was of course opposed by those in the highest graded university posts, in what was really a corporate reflex response of the corps of professors to defend their status.

The fight was quite violent, but it did not last even ten years. In 1986, when Bourguiba was aging and the ensuing succession crisis was dragging on, Tunisia suffered an unprecedented economic setback. For the first time, terrorist attacks attributed to fundamentalist Islamic groups hit tourist spots. In the context of political instability and economic austerity, the funds for research were suspended and the experiment that had been conducted since 1978 was abruptly interrupted. A few years later, after President Bourguiba had been ousted, the university academics attempted to take control of the situation by founding, in 1989, a National Foundation for Scientific Research deemed to be an instrument to serve academic research. This organization did not succeed in establishing itself, seeing that there was no support from the newly installed government, and it lasted only two years.

3. CHANGEOVER TO A MARKET ECONOMY AND HIGH TECHNOLOGY

The period 1991-1992 proved to be a turning point. More than ten years had passed with initiatives taken and promoted by the scientists themselves, a period of rifts within the scientific community and destructive actions on all sides. Now the scientific sector was once more to be taken charge of by political power, at the highest level, meaning the President of the Republic.

Science steered from above to serve the private sector

Two main motives lay behind the new President's move. The first was purely political, that of calming a conflict which had spilled over from the academic world to take a political turn in bringing into opposition two men serving the new government, the Minister of Education and his Secretary of State for Higher Education and Research.[7] The second had more to do with economic and political circumstances. The Gulf War of 1990-1991 had not only confused the political points of reference in the Arab world but had also brought a reminder of the cruel technological dependence these countries suffered –Tunisia included. From that sprang the idea of reviving a form of scientific research that could answer "national needs".

[7] - These were conflicts of personalities and differing political position rather than concerning strategies for scientific research.

Some of these needs remained the same: water, energy and the harnessing of natural resources (mining, agricultural and fisheries). However, in the context of the transition towards a market economy begun in 1986,[8] another preoccupation emerged which steadily became the ultimate system of reference and the leitmotif of every proclamation on the subject : scientific research, especially in the leading-edge technologies (computing, communications, biotechnology), had also to ensure that industry was competitive in the face of international competition; this research would have to be the driving force for modernization of the private sector, which from then on was promoted to the rank of favoured agent in "national development".

President Ben Ali had made such policy part of his own reserved sphere of action.[9] The policy was from then on to be decided from above. It was therefore entrusted to a new supervising structure, a State Secretariat for Scientific Research and Technology (SERST), under whose care were placed eight non-university research centres. The global allocation for the sector was substantially increased[10] and the centres, financed on the basis of National Mobilization Programmes, each in its own field, was given the task of responding to the "social demand" of research and of bringing their contribution to the technological modernization of the Tunisian economic fabric.

Unlike in previous years when the initiatives and struggles –even when most ferocious- stayed within the confines of the universities and in ministry corridors, the policy conducted by SERST was given powerful media coverage. Each initiative was widely broadcast, several campaigns of "national consultation" of scientists were organized and abundantly commented on in the press and in the national media. This media coverage was by no means fortuitous. The new science policy evidently served an additional, symbolic purpose. The new power's interest in science enabled it to consolidate its role as "rampart against obscurantism" in the context of the ruthless struggle waged against fundamentalist Islamic movements after 1991. On another level, the recurrent discourses on themes of "modernity", "competence", "excellence" and "competitiveness" formed part of an education process in support of a transition to a free-market environment, whose aim was to provide the public with justification for the attendant political and economic changes.

The finest jewel of this new ethos, in terms of scientific constructions, is incontestably the Regional Institute for Computer Sciences and Telecommunications (*Institut Régional des Sciences Informatiques et des Télécommunications, IRSIT*). This research centre, founded in 1987, was presented by its promoters as counter-model to the university. Here there would be no activity that did not answer a demand; research was to be oriented resolutely towards "problem solving" and the passing of contracts with external partners had to be the preferred funding mechanism[11]. IRSIT's higher staff were quick to criticise a bureaucratic style of academic research, disconnected from reality, which for them was a legacy from the French model. They willingly took reference from the "American model".. Its influence was quite noticeable -even as far as the office decor. A number of them do indeed belong to an "American generation" trained in the USA in the 1981-1990 period under a US-AID Technology Transfer Program.

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[8] - Date of the implementation of the first Structural Adjustment Plan in Tunisia.

[9] - Several observers have reported on his fascination for information technologies and computers (see Nicolas Beau and Jean-Pierre Tuquoi, 1999, *Notre ami Ben Ali*, Paris, La Découverte, p.103 and following pages).

[10] - The public budget allocation for research rose from 38 to 55.3 million dinars between 1992 and 1995, an average annual rise (at + 13%) higher than that of the overall State budget (+ 11.3%).

[11] - Research activity was focused on three areas: man-machine interface, telecommunications and networks, systems for assisting decision-making.

A social demand for science difficult to find

A few years in operation, however, gave clear signs of the limitations of this drive launched with such determination and founded on the idea of a science aimed at serving the competitiveness of industrial companies. The IRSIT, called on to spearhead this policy, provides the best example. In 1998, the analysis of the projects developed at the Institute revealed that only 7.5% of them were for private concerns and, in any case, this meant companies "in general" and not concrete entities bound to IRSIT by contract. Moreover, less than 5% of researchers' activity was devoted to this. The overwhelming majority of research effected there continues to be financed, directly or indirectly, by the State and by international aid schemes. As for the results, they are mainly destined for the State or semi-public sectors. The research conducted in the research centres under SERST was still therefore being carried out by and for the State.

The almost complete absence of "social demand for research" can be explained quite easily by the industrial and economic fabric of Tunisia. This was woven over a period of 20 years, in keeping with the option adopted to specialize in international sub-contracting, a decision taken at the beginning of the 1970's. The result is a very low level of technology in keeping with the limitations of product assembly or processing for export (textiles, mechanical or electronic products). Companies most commonly use dilapidated outdated equipment needing only a meagre force of technical supervision staff,[12] let alone systems of innovation. Conditions were such that organizations like IRSIT, however strong their capabilities, were doomed for ever to remain under-employed centres of excellence, or as its first director put it: "a Rolls in working order but with no-one who can go for a ride".[13]

Paradoxically, it was at this moment that on the university side some teacher-researchers undertook to establish joint projects with public or private industry, in chemistry for example (the sector of phosphates or hydrocarbons, lubricants and so on), but also in biology (aquaculture). They discovered on this occasion that the industrialists were the more timid in the face of innovation. This fact helped alleviate their own complexes when confronted with the accusations of withdrawal often uttered in their direction: "The university has always been accused of being shut away in its ivory tower", remarked a chemist of the Tunis Faculty of Sciences, "but it has turned out not to be so clearly the case. If there were no relations between industry and university the fault came from both parties"[14].

This discovery – reassuring for some – did not stop them, in the mid 1990s, from being deeply disheartened by the lack of consideration and means government authorities granted them. University research remained extremely marginalized. The closely specified themes of study laid down by calls for tender issued by the National Mobilization Programmes most of the time prohibited their access to the most substantial funds. In spite of a potential superior by far to that of the research centres (1543 researchers and 214 teams declared at the university in 1994, against 181 researchers and 47 teams in the research centres), the financial packages were largely unfavourable to them, in a ratio of 1 to 5 in the best of cases.[15]

[12] - In the mid 1990s the average management rate (number of engineers in relation to the number of employees) was 0.9%.

[13] - Interview with the author, 1996.

[14] - Interview with the author, 1996. Some are more categorical: "The research we do does not interest our industrialists. They do not find what they want there. What they want is to buy things ready to use" (Professor of physics, Tunis, interview with the author).

[15] - See Siino (1999, p. 412 and following pages).

4. SCIENTIFIC RESEARCH : FROM CLANDESTINE ACTIVITY TO LEGAL RECOGNITION

The Tunisian power came to change the direction of its management of the scientific sector. It was no doubt prompted by the ineffectiveness of the policy hitherto conducted and an awareness of the waste of potential of university research. In the second half of the 1990s, the authorities worked to calm the tensions within the scientific community. They did this while continuing the overall effort given over to the research sector. They endeavoured to pacify relations between the different institutions and supervising bodies to bring to an end a destructive seesawing and to rekindle motivation in university research.

This effort was made manifest by a growth in the budget allocation for the scientific sector and in the proportion of the Tunisian GDP research expenditure represented. This ratio increased from 0.28% in 1992 to 0.45% in 2000, a rise of 60% in ten years.[16] Moreover, a more rational research infrastructure policy implemented since 1993 has allowed the acquisition of 19 items of heavy or semi-heavy equipment which have been assigned in a more balanced way than before between the capital (1/3) and the provinces (2/3).

More significant perhaps than the increase in global financial means is the enhanced recognition of scientific research as an activity in itself, doted with its own infrastructure and funding mechanisms. This represented a decisive shift in attitude that occurred during this period.

A primary step in this direction was accomplished in 1994 with the setting-up of a basic support system for university teams (termed from this date onwards "Research Teams"). These saw themselves endowed with a sum, small but regular, in proportion to their contribution to the training of young researchers (meaning in concrete terms a *pro rata* rate according to the number of students training towards a doctorate). On this basis, 166 teams[17] involved a total of 1500 researchers doing their training were at first financed, receiving about 1000 DT per researcher trained. Even if it was sometimes perceived as a stopgap solution, this measure has generally been well received by university researchers for whom the assurance of a regular annual funding compensated for the meagre sums they were paid. They saw in it also a *de facto* (if not *de jure*) recognition of the research team as an entity, a way out of a somewhat clandestine operation and therefore a step towards an institutionalization of laboratories (not without reason, as subsequent events have proved).

The updating of the data concerning the development of this formula can bring into relief the main features of training by research at the heart of the Tunisian university system.

Table 1 : Training by research : trends in Research Team numbers

DISCIPLINES	TEAMS IN 1994		TEAMS in 2000		Change in proportion to total
Biology	39	18.2 %	58	13.5 %	- 4.7 %
Engineering sciences	35	16.3%	78	18.3 %	+ 2 %
Medical sciences, Pharmacy	33	15.4 %	66	15.4 %	0
Chemistry	33	15.4 %	51	11.9 %	- 3.5 %
Physics	31	14.5 %	42	9.8 %	- 4.7 %

[16] - This spending is still taken on mostly by the State. According to the Tunisian Ministry of Research, industrial companies' current contribution to research expenditure is 5.5%.

[17] - Out of a total of 244 surveyed in 1994.

Geology	17	8 %	26	6 %	- 2 %
Mathematics, Computer studies	13	6 %	39	9.1 %	+ 3.1 %
Human and soc. sciences, Arts	10	4.7 %	22	5.1 %	+ 0.4 %
Law and Economic sciences	3	1.4 %	45	10.5 %	+ 9.1 %
TOTAL	**214**	**100 %**	**427**	**100 %**	

Source : Data formalized using figures from the Ministry of Higher Education.

After the introduction of this mechanism, the number of Research Teams doubled in six years. This gives proof not only of the pressing need in which university research found itself up to that time, but also of the reality of the transmission of knowledge and of scientific practices within universities. The variations in proportion to the total must be regarded with caution. Marked increases probably indicate a certain delay on the part of researchers in declaring themselves as "teams" when the first call for tender was issued in 1994 (the most salient case was that of the law and economic sciences fields). Conversely, the small increases, and even the falls in numbers must no doubt be interpreted as showing a greater ability to get mobilized right from the outset of this financing mechanism (the case for biology).

Balance restored between universities and centres of research

In a second phase, an even more decisive stage was reached in 1996 when, for the first time in Tunisia, a law concerning scientific research was adopted.[18] One of the major advantages this legislation brought was the authorities' official recognition of two types of structure, both devoted to research: the Laboratories of Research (LR), teams made up of at least a dozen teacher-researchers (or researchers) built around a nucleus of senior scientists; the Units of Research (UR) which were smaller and needed fewer experienced researchers. Also for the first time, the dichotomy between the universities and the centres of research was broken, owing to the fact that these structures could be officially recognized whether they were within universities or Public Research Establishments.[19] Indeed, 71 Laboratories of Research (32 under the MRST, 39 under the MES) and 305 Units of Research (46 for the MRST, 250 for the MES) were approved from 1999, when the law came into effect. Procedures for joint administration were introduced seeing that henceforth the Ministry of Research was to≤finance all these laboratories, including those installed in universities.[20]

Table 2 : Units of Research (founded since 1999)

DISCIPLINES	Units of Research in 2001	
Biology	33	12.8 %
Engineering sciences	32	12.4%
Medical sciences, Pharmacy	70	27.2 %
Chemistry	28	10.9 %
Physics	18	7 %
Geology	9	3.5 %
Mathematics, Computer sciences	22	8.6 %

[18] - Law n¡96-6 of 31 January 1996 and government orders 97-938 to 942 of 19 May 1997.

[19] - In other words, the seven centres of research coming under the Ministry of Scientific Research and Technology (formerly the Secretary of State department) and twenty others of varying size and activities which reported to other ministries (Agriculture, Health, Defence and so on).

[20] - With an average annual budget allocation of around 50 000 dinars (41 660 euros) per laboratory.

Human and soc. sciences, Arts	17	6.6 %
Law and Economic sciences	28	10.9 %
TOTAL	**257**	**100 %**

Source : Data formalized from Ministry of Higher Education figures.

Table 3 : Laboratories of Research (founded since 1999)

RESEARCH AREAS OF LABORATORIES OF RESEARCH	Laboratories of Research in 2001
Reporting to Higher Education Establishments (Ministry of Higher Education)	
Man and society	4
Law, economics and administration and management	6
Information technologies	6
Biotechnology	2
Materials science	7
Engineering science and technology	2
Medical sciences	6
Earth sciences	4
Chemistry	2
Reporting to Public Research Establishments (MRST and other ministries)	
Agricultural sciences	8
Marine environment	3
Energy resources	5
Biotechnologies	14
Economics and management	2
TOTAL	**71**

Sources : Data formalized from Ministry of Higher Education and Ministry of Scientific Research figures.

The 1996 law on scientific research therefore conferred the legal recognition on research entities which scientists had long been claiming. It also ushered in a homogenization of structures and rebalancing of the share-out of funding. The latter had up to then been heavily biased towards research-development controlled by the MRST. As a result, scientific research globally appeared better able to escape the horns of the dilemma on which it had been held by the previous situation: either a personal way of doing research with uncertain means and bereft of any recognition, or a work programme planned by the official public bodies based on ambitious criteria but poorly adapted to the possibilities and real needs of the country.

Caution must be used in examining data to bring out the relative weight of the different disciplines. However, there does appear to be a predictable correspondence between potential in research and potential in training. Three fields are at the top : medical sciences, biology and engineering sciences (52.5 % of the Units of Research focus on these three). Chemistry arrives in the middle. Three sectors are less well represented: geology, mathematics and physics. For the first two of these disciplines, this relative weakness must be considered alongside the fact that numbers traditionally involved have been much fewer than in other disciplines. The case of physics is, however, more surprising. It is a discipline which has for a long time had many adherents, but it appears to have suffered more than others from students' disaffection for fundamental sciences in general.[21]

[21] - This trend has been observable in Tunisia since the beginning of the 1980s. At that time, students in fundamental sciences made up about 22% of all students; at present the figure is no more than

Even though the overall research potential in Tunisia remains mostly localized in the universities, a new balance seems to have been struck between what was hitherto considered by government powers as a purely "academic" (university-based) science, objectively poor in means and strongly tinged with establishment thinking, and a type of research "with applied aims" deplored by a large part of the scientific community and in any case limited in its real adaptability to social demand.

A growing scientific production

It is difficult to give a definite assessment of the consequences of this policy of support and remobilization of scientific research in Tunisia. The number of scientific publications, which is the indicator most generally used, points to a marked advance in Tunisian scientific production over the past ten years. It is evidently difficult to obtain data on this production as absolute values, but it remains possible to give a relative value in comparison with the content of scientific data bases and measure any increase. Recent evaluations compiled using INIST data bases "Pascal" and "Francis",[22] show that the proportion of Tunisian publications in relation to all those counted progressed from 0.06% in 1990 to 0.14% in 1999, signifying just over a doubling of the proportion.

This Tunisian contribution to the range of publications surveyed by the data bases varies strongly according to the discipline. Three fields have a particularly significant weight:[23] medicine, mathematics and earth sciences, having respectively the ratios 0.23 %, 0.20 % and 0.18 %. Next, but a long way behind, come chemistry and physics (each with 0.11%), then life sciences (0.08), computer sciences (0.08 %), pharmaceutical sciences (0.06 %) and engineering sciences (0.06 %). Although it is quite difficult to analyse these uneven levels of publication, among the possible explanatory factors can be suggested the length of time some disciplines have been well established in the Tunisian universities, which certainly works in favour of the first three (medical sciences, mathematics and geology) but to the detriment of those with the lowest scores (notably engineering sciences and computer sciences).

Another sign of the growing dynamism of Tunisian research teams can be seen in the uninterrupted rise in the number of projects submitted to partnership aid organizations. French scientific aid – the one most involved in Tunisia and represented in the whole range of disciplines – has seen the number of projects submitted annually go from a little less than 100 in 1994 to nearly 300 in 2001, 70% of which were rated "excellent" by the experts in charge of selecting the projects.[24] The fact that this demand was less linked than previously to a context of shortage of national funding appears to indicate a genuine dynamism at work in Tunisian science.

5. RISKS OF WITHDRAWAL, NEW OPENINGS

The actions of the Tunisian governing powers for scientific research seem undeniably to have given a new impetus to the scientific community which, only a few years ago, was tempted to give in. All factors together -the growth in means invested, their rationalization and

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14%. This decline has been compensated by a strong growth in legal studies, economic sciences and management and, to a lesser extent, technical sciences.

[22] - These assessments were conducted by the Joint Committee for Academic Aid (*Comité Mixte de Coopération Universitaire*) (a Franco-Tunisian organization for partnership aid in scientific research) and INIST (source: www.cmcu-fr-tn.org).

[23] - Data 1998.

[24] - Source CMCU, *Idem*..

official recognition of the university component (which had hitherto been marginalized)- contributed to give scientific activity as a whole a legitimacy which its social effectiveness alone cannot in all evidence provide for the moment.

Continuity of policies

For all that, many uncertainties hang over Tunisian science and its future. As already stated, most scientific activity still goes on predominantly in the universities. But the university system is on the verge of collapse under sheer weight of numbers: 210 000 students were enrolled in 2000, whereas forecasts made some years previously anticipated only 145 000. The researchers, the overwhelming majority of whom are also teaching staff, have to find not only the means, but also the time to get away from their educational and administrative duties to devote themselves to research, which is becoming increasingly difficult.

The university scientists, newly upgraded by official recognition of their research activity, are in other respects faced with a serious risk of erosion of their professional status. The Tunisian higher education authorities, with the support of the World Bank and in a context of an openly adopted free-market orthodoxy, have chosen to favour first the new fields of excellence, and secondly a system of short technical training periods, aiming to train qualified people adapted to the labour market. A new generation of institutions has therefore recently appeared[25] whose legitimacy hangs not so much on the production of knowledge as on the "employability" of those who qualify. Now these receive portions of budget beyond comparison with the sums invested in "historical" faculties.[26] In such conditions, it could be wondered if the strongly determinist policy in force for several years now in favour of scientific research is, as in past situations, in danger of being abruptly challenged with the accusation of being an "unproductive" activity.[27]

A deepening rift between North and South ?

Another risk looming over the Tunisian scientific community is a gradual cutting of bridges by scientific circles of the industrialized countries of the North -and especially of French research, which is the first stop Tunisian researchers have on the way to integrating into international networks. The importance of such strong links has already been mentioned. They go back to the first decades of independence and were forged by the massive fluxes of scientists of both countries toing and froing and during long stays on both sides. Young Tunisian researchers underwent long years of training in French laboratories and French scientists were sent under partnership schemes to help set up the first Tunisian scientific structures. We have seen how these close links had led to intense cooperation and had moulded –for better or worse- the Tunisian university system. Since then, the strong presence

[25] - These institutions of "excellence" include the *Ecole Polytechnique* of Tunisia (since 1998), the Preparatory Institute for Scientific and Technical Studies (IPEST since 1993) and the *Ecole Normale Supérieure*.. At the core of the network of "technical" Institutions there are the National Institute for Applied Sciences and Technology (INSAT, since 1996) and 11 Higher Institutes for Technological Studies (ISET) founded according to the blueprint of the French IUTs (*Institut Universitaire de Technologie*).

[26] - See Nadia Omrane, "A damning report of teachers at the Tunis Faculty of Sciences. Have we really a "useful" university?" (Un rapport accablant d'enseignants de la Faculté des sciences de Tunis. Avons-nous vraiment une université "utile"?"), *Réalités*, n¡ 810, 5 - 11/7/2001.

[27] - Position formulated explicitly in a World Bank report on higher education in Tunisia written in 1998. See Ben Kahla (2000, p.164).

of French scientific aid on the ground[28] and its material and symbolic support indisputably contributed to the survival of Tunisian research in the worst moments of its history. This, in the same way as it had played a role in defending the "public science" model and institutions in the context of a shift towards a strongly market-economy ethos.

However, for some years now, several factors have been working in the opposite direction, towards a slackening of ties. The youngest generations of Tunisian researchers who have not yet established networks abroad could pay the price.

The first factor concerns the difficulties these young researchers experience in trying to come to do training in laboratories North of the Mediterranean. Since the 1980s, France, like the other European countries, has put in place a restrictive immigration policy regarding the countries of the South. Obtaining a long-stay visa for studying –then any visa at all- has become more and more difficult. Control of interchanges and flow of scientists, academics and intellectuals in the broadest sense has progressively been taken away from the universities and aid organizations to be placed exclusively in the hands of the Ministry of the Interior and the prefectures. This trend towards closing the gates on the South came at the same time as doors were opened wider for intra-European exchanges and flows, revealing a deliberate policy of reorientation of academic and scientific aid on the part of the countries North of the Mediterranean. During the ten years 1984-1994 the number of students who went to France from North Africa declined by nearly 20% whereas the number going from other countries of Europe expanded by 55%.[29]

In parallel with these problems of circulation, the 1990s saw a marked fall in funds devoted to partnership aid between France and Tunisia, the main channel Tunisian researchers have for gaining access to the outside world. In 1993 these funds for scientific programmes managed by the Ministry of Foreign Affairs reached 14 million francs; in 1996 they fell to a little over 8 million and in 2000 they amounted to no more than 6.2 million francs. This drastic cut in funds penalized even harder the young researchers for whom integration in international networks is essential for their future potential for action. In 1999 the "stays for junior researchers" made up only 23% of the budget allocation for Franco-Tunisian scientific aid (as opposed to 37% for "stays for senior researchers"). By 2001 stays for young researchers no longer represented more than 18%, the last budgetary item. In the knowledge, based on specific studies, that "the frequency of communications abroad depends […] on having stayed [abroad] or not in the course of a university programme"[30] and that it is the best way of avoiding withdrawal and isolation in research terms, one can gauge the risk of enclosure that these trends could bring to Tunisian academic research.

South-South cooperation : initiatives between Tunisia and Morocco

Other more positive developments deserve to be highlighted. A noteworthy initiative was the setting-up for the first time in 1998 of a scientific cooperation scheme between Tunisia and Morocco, which is to date the only one of its kind. Recent surveys have already shown that the relative closing-up of European frontiers have engendered training schemes for North African students in other countries of the Arab Maghreb Union which were becoming a major

[28] - In addition to the aid between the States managed by the French Embassy and the French Institute for Partnership Aid (*Institut Français de Coopération*), regional offices of the CNRS and IRD had also long been established at Tunis.

[29] - Data given by Lise Andresen-Vollenweider and Victor Borgogno at the meeting "Higher education graduates from North Africa: their development in Europe and reintegration in their country of origin", 27-28 November 1998, Institut Maghreb-Europe (Univ.Paris VIII).

[30] - See Gaillard and Schlemmer (1996).

phenomenon.[31] Similarly it appears that the Tunisian universities train a small number (but not negligible for a university of the South) of students from the rest of the world, nearly half of whom come from the Maghreb (48%) and more than a quarter from Sub-Saharan Africa (28%).

This cooperation between countries of the South at present also concerns scientific research. Between Tunisia and Morocco, 22 projects are currently being conducted under the supervision of a Permanent Joint Tuniso-Moroccan Committee for Scientific Research and Technology, covering quite a wide spectrum of disciplines, particularly in biology (5), chemistry and physics (8) and engineering sciences (3). In this way, in the context of a North African region where the official regional institutions (the Arab Maghreb Union, founded in 1989) have never succeeded in giving themselves any substance, higher education and research could be the agent needed to prime the links to help these countries emerge from a long tête-à-tête with the countries of the North.

REFERENCES

BEN KAHLA Karim, 2000, "La crise de l'Université tunisienne au crible de la Banque Mondiale : analyse d'une rhétorique opportuniste", in : Vincent Geisser (dir.), *Diplômés maghrébins d'ici et d'ailleurs*, Paris, CNRS Editions.

BONNEUIL Christophe, 1991, *Des savant pour l'Empire. La structuration des recherches scientifiques coloniales au temps de la "mise en valeur des colonies françaises" 1917-1945*, Paris, Editions de l'ORSTOM.

DJEFLAT Abdelkader, ZGHAL Riadh (dir.), 1995, *Science, technologie et croissance au Maghreb*, Sfax, Maison d'édition Biruni.

GAILLARD Jacques et SCHLEMMER Bernard, 1996, "Chercheurs du Nord, chercheurs du Sud : itinéraires, pratiques, modèles - un essai d'analyse comparative", in : Roland Waast (dir.), *Les sciences au Sud, état des lieux*, Paris, ORSTOM Editions.

GEISSER Vincent et BEN SEDRINE Saïd, 2000, "Les diplômés tunisiens formés à l'étranger. Analyse des profils sociologiques et des projets de retour", *in* : Vincent Geisser (dir.), *Diplomés maghrébins d'ici et d'ailleurs,* Paris, CNRS Editions.

LABERGE Paule, 1987, *Politiques scientifiques au Maghreb : l'implantation du système scientifique dans les sociétés maghrébines de 1830 à 1980*, Université de Montréal, Institut d'histoire et de socio-politique des sciences (2 tomes).

PICARD Jean-François, 1990, *La République des savants. La recherche française et le CNRS*, Paris, Flammarion, 339 p.

Politiques scientifiques et technologiques au Maghreb et au Proche-Orient, ouvrage collectif dans la collection des Cahiers du CRESM, n°14, 1982, Editions du CNRS. 359 p.

SIINO François, 2004, *Science et pouvoir dans la Tunisie contemporaine*, Paris, IREMAM-Karthala.

SIINO François, 2000, "Les représentations politiques de la science au Maghreb", *revue NAQD* (Alger), n°13, Automne-hiver 2000.

[31] - The work of Vincent Geisser and Sa•d Ben Sedrine show that about 40% of Tunisian students trained abroad and who returned to the home country over the past ten years have studies in other countries of the Maghreb. See Geisser and Ben Sedrine (2000).