Work, Ideology and Science
The Case of Medicine

vicente navarro

This article discusses the nature of work, ideology and science in Western capitalist societies. It analyses how capitalist or bourgeois ideology reproduces capitalist dominance in the spheres of production (Section I), politics (Section II), and science and medicine (Section III). Also, this article explains how the working class responds to that capitalist dominance through a continuous process of class struggle. Sections I, II and III show how class struggle affects bourgeois dominance in the processes of production, politics, and science and medicine, respectively. Special focus in Section III is on the analysis of (A) how bourgeois dominance appears in science and medicine; (B) how bourgeois ideology appears and is reproduced in medical knowledge; and (C) how class struggle determines the nature of scientific and medical knowledge. In this section, an alternative mode of production of scientific and medical knowledge, different from the prevalent bourgeois one, is presented and discussed. In all three sections, medicine and medical knowledge are chosen as the primary points of reference.

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"The docs keep telling me there's nothing wrong with the place where I work, I guess they are supposed to know it all because they have had a lot of education and everything. I'm no expert like they are, but I sure as hell know there's something wrong in that mill and other guys are saying the same thing. One thing I know for sure—that place is killing us!" — Cancer patient and steelworker from the Bethlehem Steel Corporation mills, Baltimore, Maryland, USA, 1978.

THERE is a concern among the centers of power in the Western capitalist world that something is going wrong with the nature of work in that world. Editorials in the daily press, articles in scholarly papers, reports of powerful foundations, exposé programmes on television, and even more recently, some commercial films have focused on different dimensions and components of what has been called the 'crisis at the work place' in contemporary society. Part of this crisis is the rebellion of the working populations against their conditions of work, rebellions which appear in different forms such as absenteeism, turnover, or just plain sabotage. These have reached such proportions as to become a cause for major alarm by the establishments of those societies. An example of this concern and alram is one of the reports of the powerful Trilateral Commission. A major recommendation of that Commission, which includes representatives of the power structure of the top capitalist developed societies [1], is that "a major intervention is required in the area of work in our societies" to attack workers' discontent and alienation at its roots since, otherwise, those rebellions can threaten the whole survival of the Western economic system—a euphemistic term which is used to define Western capitalism. The representatives of the bourgeoisie or capitalist class, or, to use a more American term, the corporate class, as the most class-conscious of all classes, tend to perceive quite clearly from where they sit where trouble may come from, i e, from the working class rebellion against the main column on which the entire capitalist system is built: the nature and the conditions on which basis work is extracted from the workers [2].

On the other side of the ideological fence, progressive forces in the United States have only recently begun seeing signs of that potential storm. Many, however, still seem to be stuck in that scenario so widely emphasised by ideologists of capitalism and radicals alike that the working class has practically disappeared as agents of change, and, instead, has been absorbed into society, becoming part of the larger consuming and undifferentiated masses. According to some radical theorists, other groups are supposed to have taken over that task of carrying on the much needed struggle for change. The working class, however, has been 'lost', and has become part of that one-dimensional society [3]. Witness, for example, a most recent publication edited by a leading radical in this country who, in covering the changes in the cultural meaning of medicine, refers in his introduction to the impact of blacks' and women's struggles in the redefinition of health and medicine, but not once does he refer to the struggles which are taking place at the sites of work in the Western capitalist societies [4], struggles which I believe are among the most important ones in changing the nature of our society, including the definition of health and medicine. Just in the United States alone, millions of workers were involved in strikes last year which had to do primarily with work conditions and health. From the wildcat strikes among steelworkers in Ohio who asked to change conditions of work and medical regulations which applied in their working places, to the coal miners who struck for three months—threatening, as President Carter indicated, the stablity of the economy, i e, US capitalism—for the right to strike for health and safety conditions and for the right to retain some form of control over their health plans, many instances show that major struggles are taking place at the work place questioning the meaning of work under capitalism and its effects on the health and well being of our working populations. Health-related issues have been triggering points in many of those struggles, and health-related movements have had an important impact on changing the nature of political and social institutions, including labour's own institutions. A most recent example is the key role played by the Black Lung movement in creating Miners for Democracy. That movement rallied the majority of coal miners around the issue of democratising their union, the Union Mine Workers, and overthrowing the corrupt leadership of Boyle [5]. A very important issue—a key one—in that fight was a health related issue, i e, the need to recognise and compensate black lung as an occupation related condition, and the right to strike for safety conditions. The miners fought a tough battle to redefine health and medicine, showing—against the verdict of coal companies, state and federal legislative bodies and agencies, and even large sectors of the academic community—that coal mining was indeed a very unhealthy occupation in our society.

The history of the working class in the United States, and other countries as well, is punctuated by a continuous struggle to redefine the nature of work and health. And these struggles have heightened to such an extent that, as the Trilateral Commission indicates, they are threatening the cur-

rent international capitalist order.

In summary the fight for the realisation of health is very much at the center of the conflict between capital and labour which takes place at the work place and heightens in moments of crisis like the current one. The struggle which occurs at the places of work in our Western societies is a most important one, since it questions the very basic social power relations of capitalism [6].

Nature of Work under Capitalism

Let us analyse the conditions of work of the working class, that class by whose sweat and pain the goods and services in our society are produced. A primary characteristic of work is that its controllers increasingly shape the nature of work to optimize their pattern of control over (1) the productive process; (2) the individual producers; and (3) the collectivity of producers—the working class [7]. By means of this process, the workers are: (a) compartmentalised into increasingly narrower tasks; (b) hierarchicalised by a division of labour which reproduces the class relations in society; and (c) expropriated from all possibility of controlling, influencing or having a say in the design or development of the work process of the products they create.

The outcome of this process is a set of relations which cannot be defined as less than totalitarian. Democracy, the capacity of individuals to control their own lives, stops at the gates of the working places. This set of authoritarian relations where one class—the bourgeoisie—controls that process of production and work, and the other—the working class—doesn't, is what Marx called the *dictatorship the bourgeoisie,* understanding as such not a specific political form of government but rather an overwhelming dominance and control which the bourgeoisie has over the means and process of production. Nowhere for the millions of workers does that dictatorship appear more clearly than at the place of work. Michael Bosque, in his usual vivid way, puts this quite clearly when he invites the reader to

> Try putting 13 little pins in 13 little holes 60 times an hour, eight hours a day. Spot-weld 67 steel plates an hour, then find yourself one day facing a new assembly-line needing 110 an hour. Fit 100 coils to 100 cars every hour, tighten seven bolts three times a minute. Do your work in noise 'at the safety limit', in a fine mist of oil, solvent and metal dust. Negotiate for the right to take a piss—or relieve yourself furtively behind a big press so that you don't break the rhythm and lose your bonus. Speed up to gain the time to blow your nose or get a bit of grit out of your eye. Bolt your sandwich sitting in a pool of grease because the canteen is 10 minutes away and you've only got 40 for your lunch-break. As you cross the factory threshold, lose the freedom of opinion, the freedom of speech, the right to meet and associate supposedly guaranteed under the constitution. Obey without arguing, suffer punishment without the right of appeal, get the worst jobs if the manager doesn't like your face. Try being an assemble-line worker [8].

But these characteristics of assembly line work are not unique to workers in the automobile industry or workers in manufacturing alone. Many other studies have been done showing how assembly line work where the individual worker is carrying out *predetermined tasks* over which he or she does not have much control, is also the most frequent type of work among sales, clerical and large sectors of public service workers. Indeed, that expansion of the atomised hierarchical and authoritarian division of labour growing rather than diminishing in most areas of work in society, and is being presented as needed to increase the efficiency and productivity of the workers, i e, to extract as much work as possible from the worker. But that demand by representatives of the capitalist class is not made without misgiving about how long the working class will tolerate those conditions of work. As a leading exponent of the establishment put it, "How long can our political system stand the seventy million who live the majority of their working hours in an atmosphere which is totalitarian?"[9]

In the following pages of this article, I will explain how bourgeois ideology [by ideology, I mean, with Gramsci, the ethical, juridical, political, esthetical, and philosophical ideas about social reality as well as the set of customs, practices and behaviours which consciously or unconsciously reflect that version of reality] reproduces these dominant/dominated relations in the sphere of production (Section I); in the area of politics (Section II); and in the area of science (including medicine) (Section III). Needless to say, dominance does not mean complete control [10]. The working class does not remain passive against that domination. A *continuous process of class struggle* takes places where the working class also wins most significant victories and determines changes in the boundaries, means and instruments of that dominance [11]. How this class struggle affects that dominance in the world of production, of politics, and of science is also covered in Sections I, II, and III, respectively. In all three sections, *I have chosen medicine and medical knowledge as the primary points of reference.*

I

Work, Market Ideology, and the Reproduction of Power Relations

How is class dominance being reproduced? By different means. For example, the division of labour within the working class, by dividing the labour force into different categories, erodes a sense of class solidarity. Also, tending to reproduce those dominant/dominated relations are the conditions of work, highly hierarchical and authoritarian, which tend to create a habit of submission and subordination, further accentuated by a fear of unemployment or dismissal which tends to produce an obedient body of workers and citizens.

But besides these reasons, there are two others which explain the reproduction of these relations. One, very impotant ideologically, is that this type of work is presented, not as a result of specific power relations in soceity, but rather as a logical, rational, and natural outcome of the unavoidable and unchangeable industrialisation and technologisation of the work process. Thus, the culprit of workers' pains is seen in the unchangeable industrialisation and technology of work rather than in the social power relations which determine this specific type of oppressive industrialisation and technology. Needless to say, the absence in the current historical period of models of alternative processes of production and work strengthens the ideology that ours is the only logical, rational and natural way of organising production. But dominant

ideology tries to impress on the worker that those relations are not only *natural* but also *fair*. This dominant/dominated relationship in the world of production appears as a fair exchange in the labour market in which these exploitative relations are veiled and mystified by making them appear as a matter of free, unfettered and equal exchange between the labourer who sells his labour and the capitalist who pays a wage for it. Needless to say, bourgeois ideology may even be willing to admit and accept that much work today is oppressive and does not offer the possibility for self-fulfilment to the worker. But this same ideology will quickly add that the worker is compensated with a fair wage and that fair wage will allow the worker to obtain the key to the door to his self-fulfillment in the house of consumption. The worker, denied the possibility for creativity and self-fulfillment in the world of production, is said to be given that possibility in the world of consumption. Moreover, while he has no control over the work process, he is being told that he has control over the product of that process where, not as a worker but as a consumer, he can, through the free expression of his wants in the market, allocate the resources in that society. Thus the sovereignty denied to the worker in the world of production appears as the sovereignty of the consumer in the world of consumption. In this scenario, the criteria and discussion of fairness is not over the control of the process of work but, rather, on the price to pay and compensate the worker for his work so that he may reach a sense of fulfilment, control, and pusuit of happiness in the world of consumption.

Suffice it to say, it is of paramount importance for the reproduction of the capitalist system that all struggles at the point of production be shifted to the area of consumption, *with the focus of the struggle being the cost of labour—personal and social wages—rather than the control of the process of production.* The acceptance of this shift in the struggle from the world of production to the world of consumption by the trade unions and their consequent focus on the price of labour has been a primary reason for the reproduction of capitalist relations. As Gramsci indicated "trade unionism by organising workers not as producers but as wage earners had accepted and submitted to the rationale of the capitalist system where workers are merely sellers of their labour power" [12]. The shift from workers to wage earners is a key mechanism of reproduction of capitalist relations and responds to the intrinsic need of capitalism to separate the world of consumption from the world of production, focusing all areas of conflict on the former and not on the latter. Capital, in its position within the class struggle, clearly perceives the correctness of Marx's position when he wrote in the *Grundisse* that, "...the important point to be emphasised here is that whether production and consumption are considered as activities of one or separate individuals, they appear as aspects of one process in which production forms the starting point and therefore the predominant factor..." [13]. A predominant factor whose control capital cannot allow to be questioned.

A consequence of that bourgeois ideological dominance and acceptance of the *unalterability* of the process of work (and shift of the struggle from the world of production to the area of consumption) has been the acceptance by the unions of damage created at the work place as being unavoidable, and thus the *champ de bataille* has been on the compensation for that damage. Consequently, occupational medicine, a branch of forensic medicine in its beginnings, had, as its initial task, to define for management the nature and size of the damage which needed to be compensated. Occupational doctors, still called company doctors in many countries today, had as a primary function, to defend management interests and obfuscate or veil the actual damage created at the work place. The struggle was, and still continues to be, between labour which demanded a higher compensation, and capital (helped by occupational doctors) who wanted to minimise that compensation, denying for as long as they could that there was any relationship between work, disease, and death. Let me add here that not only occupational physicians directly employed by management but many in academe, medical schools and schools of public health, supported directly and indirectly by grants or funds from industry or industry financed foundations, contributed to veil and mystify that relationship between work and disease [14].

A further consequence of the separation between the worlds of production and of consumption was that the damage created at the work place, when and if recognised, was perceived to be unrelated to the damage produced outside the work context. Thus, a dichotomy was established between the branches of medicine responsible for the definition and administration of disease at the work place (occupational medicine) and at the non-work place, in the world of consumption (medical care). That dichotomy, production/consumption, is till present today and is being reproduced in the structure of health services with different administrations responsible for those two separated branches of medicine.

In summary, that shift of the struggle around the work place from (1) control of work to compensation for damage; and (2) from the world of production to the world of consumption, has led to the establishement of occupational medicine as a separate branch of medicine historically controlled by management in charge of defining damage and compensation. Needless to say, the priorities within the social system were higher for the medicine of consumption than for the medicine of production, particularly considering that a primary function for the latter—the one of policing the labour force—was achieved under capitalism by other effective means than occupational medicine.

All these struggles on compensation were, for the most part, carried out under the supervision of the state institutions where capital was far more influential than labour, which leads me to discuss the second area where those dominant/dominated relations are being reproducd, i e, in the realm of the political institutions.

II

Work, Political Ideology and Reproduction of Power Relations

In the same way that it is of paramount importance for the reproduction of the dominant/dominated relations at work to shift all struggles around the control over the pro-

cess of production to world of consumption, it is equally important to shift those same struggles from the world of work to the world of representative politics. Indeed, just as the worker/subservient relationship is concealed at the economic level of our society under the ideology of consumer sovereignty, the worker/subservient situation is concealed at the political level with the dominated worker being presented as citizen/sovereign. According to bourgeois ideology, people decide through the market what they consume and through the political process what they want. A clear representative of this position is Eli Ginzberg, Professor in the Business School at Colombia University, who begins a book entitled *The Limits of Health Reform: The Search for Realism*, with the following sentence. "In our society, it is till the citizens who, through their voice in the market place and in the legislature, ultimately determine how their resources will be allocated" [15]. According to this ideology, workers become citizens, and as such, have the same rights as the controllers of their work. The assembly line workers are supposed to have the same rights as the controllers of their work. The assembly line workers are supposed to have the same political and juridical weight, according to legislative discourse, as the Henry Fords of America. Both categories—bosses and workers—are abstracted into a new category, the citizens who decide, with equal weight, the major political decisions. In the political - juridical realm, they are both equal. But is it really true that they both have the same power to choose, decide, and develop different political alternatives? Many studies have been written showing that the Henry Fords of America, or of any other Western capitalist country, have far more power—an overwhelming power to shape the nature of what is discussed, voted upon and presented in the political debate—than the assembly line or other type of workers[16].

In order to consider them with equal political power, Ginzberg and others with him have had to consider them as individual citizens, an abstract category which levels off everyone independent of their position in the world of production where goods and services are being produced. But men and women under capitalism are not equal. That assumed equality in the realm of politics is continually shown as inequality in the realm of production. Under capitalism, the relations of production allocate men and women into different social classes, defined by their differential access to and possession of the means of production[17]. Agents within those classes have, indeed, different political and thus juridical power. The class which owns, controls and possesses the means of work has a dominant hegemony in the political - juridical apparatuses of the state and in the ideological - cultural apparatus of society[18]. It goes without saying that the intellectual representatives of that class deny this, dismissing it as a simplification, tolerable for "ideologues" but not for reasonable people. They present it as a matter of fact that the political juridical institutions are an outcome of people's will who, via the electoral process in representative democracy, periodically elect those on whom authority is being bestowed. Consequently bourgeois dominance in the apparatus of representation is denied by burgeois ideology in which bourgeois domination is veiled and mystified as representing the popular sovereignty and the *vox populi*. According to this ideology, the workers, regardless of how exploited in the economic arena they may be, are still supposed to be free and equal citizens who, by their will, have chosen, and continue to choose, a system which reproduces that system of exploitation. This is the most important ideological legitimation of the bourgeois rule, i e, people want it and choose it.

It is worth stressing that in this scheme of things, democracy is not—as Lincoln said—government by the people—but one occasionally *approved* by the people. Democracy is thus defined differently from self-governance. In such a democracy, governments come and go at the approval of the people. In this respect, the government is assumed to represent *we, the people*, and what happens in our societies is what we, the citizens, want. As Etzione recently indicated in *The Washington Post*, "we, in the United States, have decided that we value production more than risk or damage at the work place"[19]. And that *we* is supposed to mean, of course, the American people who have expressed their political will through their political institutions. We, the citizens, have chosen to maximise production rather than safety at work. It speaks of the overwhelming dominance which the bourgeois position has in official and academic discourse, that those authors such as Ginzberg, Etzione and many others can consider these expressions as merely factual and absent of ideological meaning. They would strongly deny, of course, that they are bourgeois ideologists who reproduce the scheme convenient and favourable to dominance of our lives by the bourgeoisie. It is easy to predict that the bourgeois theorists would dismiss as 'rhetorical' the interpretation that it is not we, the American people, but the capitalist class which primarily—although not exclusively—dominates the state functions; and that it is not we, but the controllers of work, who decide on the nature of production and consumption in society. They would, indeed, dismiss that as Marxist "rhetoric". But they do not realize, or want to realize, that theirs is also a rhetoric and one which reproduces a pattern of class power relations where the minority and not the majority makes the major decisions. In summary, each ideological position has its own discourse dismissed as 'rhetoric' by its adversary. The untenability and incredibility of bourgeois rhetoric which assumes that we, the American people, decide on major issues in society, is increasingly clear for all to see. The majority of American citizens who belong to the working class and lower middle class know reality far better than the bourgeois theorists. In many polls, they have expressed their belief that the two major parties are controlled by corporate America and that the government institutions work principally for the benefit of Big Business—that folksy term used to refer to the capitalist class[20].

In summary, then the dominant/dominated relations at the work place are being reproduced by shifting struggles from the world of production to the world of representative politics where the bourgeoisie is the dominant force. It is of paramount importance for the bourgeois order that a clear separation be established between the *economic* class struggle confined within trade union battles (primarily concerned with the price of labour and compensation of work and damage), and the *political* struggle carried out primarily by

the political parties in the realm of representative democracy. As many points in history, from the General Strike in Britain in 1926 to the May events of France in 1968, show quite clearly, the shift of the place and focus of struggles from the place of work to the arena of representative politics has had a most important effect in diluting threats to the bourgeois order. But why this dilution—this weakening of that threat when the area of struggle shifts from the floor of the factory to the parliament? One reason is that representative democracy converts the process of participation *from active to passive*, delegating popular power to elected and/or selected representatives. These representatives, however well they may represent the interests of the working class and popular masses, have to conform to a set of rules and operate within a set of *state institutions where the bourgeois is, by definition, dominant*—a bourgeois dominance which gives its character to those institutions, including the institutions of representation and mediation[21]. Thus, it has always been in the interests of the bourgeoisie to demobilise the mass struggles occurring in the places of production by shifting those struggles to the parliament or its equivalent.

The previous paragraphs should not be understood as shying away from or slowing down the struggles which need to be carried out within the state and organs of representative democracy. *The class struggle carried out within the apparatuses of the state can lead to substantial victories for the working class.* The National Health Service in the United Kingdom, for example, was, no doubt, a remarkable achievement for the British working class. But it would be wrong to consider the NHS as a socialist apparatus within a bourgeois state [22]. I have shown elsewhere how the NHS is under the hegemony of the bourgeoisie, a hegemony which appears in the ideology, composition and distribution of medicine in the UK [23]. Similarly, the occupational health legislation which has appeared in the United States from the late sixties and early seventies has to be seen also as a great achievement for the US labour movement. But the fact that these achievements have occurred within a state that is under bourgeois dominance explains the limitations and the nature of that progressive legislation. The consequences of bourgeois dominance are many. One is that programmes established by legislative mandates tend—*in the absence of continuous pressure from the working class*—to be manipulated by the components and strata of the bourgeoisie which are affected by that legislation. Lobbies of those groups are "always there, close to the corridors of power" to limit and change the progressive impact and nature of those programmes. But, more importantly, those programmes have to operate within parameters which are defined by the overall power relations in that society and which cannot be touched upon by those programmes. For example, great stress is made by all governments that occupational health programmes cannot interfere with the overall pattern of capital accumulation. Capital formation and the subsequent class power relations which it sustains cannot be affected by that type of legislation. And when it is, enormous pressures are brought to bear on governments to assure that that situation be reversed.

Last but certainly not least, another consequence of bourgeois dominance in the apparatuses of the state, including those progressive programmes, is that the implementation of those programmes is carried out within the ideological framework convenient to the reproduction of the bourgeois order. For example, the prevalent approach of state regulatory agencies in occupational medicine is to protect the worker against an environmental agent such as the toxic substance which can harm the worker. Consequently, a struggle takes place around the allowable exposure of the worker to that toxic substance [24]. This struggle *is a very important and needed one.* But it is still carried out within that ideological dichotomy of worker versus environment which assumes and independence and autonomy where the worker is on one side of the working scene and the environment is on the other. The dichotomy of patient or potential patient versus environment characterises, as I will discuss later on, the conception of risk and disease in bourgeois science. To the same degree that the bacteria was perceived to be the external cause of disease, the toxic substance is now perceived to be the cause of that disease. In either case, however, such a dichotomy is a faulty one. The social power relations which determine the environment of exposures also determines the nature of the work process and of the agents of that process, i e, the workers. The social power relations which determine the working environment also determine how the worker fits within that environment, relates to that environment, and perceives himself or herself in relation to fellow workers and to the controllers and managers of that environment. In other words, by focusing only on a specific item of that environment (the toxic substance) and by not touching on the power relations which shape both the environment and the worker, the bourgeois order is reproduced.

III

Bourgeois Dominance, Ideology and Knowledge in Medicine

In previous sections, I have discussed how bourgeois dominance appears in the world of production and in the political-juridical level of society, and how that dominance has many implications in medicine as well. In this section, I will focus on how that class dominance appears also in the production of knowledge in medicine. Many studies have been written showing how bourgeois dominance of our research institutions including medical research institutions has determined a set of priorities that, while presented as apolitical, are, in fact, clear political statements which reflect the class dominance of those institutions. Elsewhere, I have discussed how that overwhelming class dominance of our research institutions explains, for example, why most of cancer research in Western capitalist countries has focused on biological and individual behaviour, but not on other factors such as carcinogens that exist in people's work places which could be threatening to the sections of the bourgeoisie that have a major influence in the funding institutions for cancer research [25].

It would be erroneous, however, to believe that those cancer research priorities are merely a result of the influence of

powerful interest groups in the top corridors of power in funding agencies. There is more to it than that. These groups belong to a class—the bourgeoisie—which has an ideology or vision of reality with an internal logic and consistency which, in turn, leads to the support of some positions, conclusions, and priorities and to the exclusion of others. This bourgeois ideology is the dominant one under capitalism. That it is dominant, however, does not mean that that bourgeois ideology is the only ideology. In this regard, it has to be stressed that each social class had its own vision of reality and ideology. In other words, there is not under capitalism, just a single ideology which is upheld by all classes, races, and sexes. I stress this, because on both sides of the ideological spectrum, there are ideological currents which postulate that there is in any society *just one ideology*—the dominant or ruling ideology—which has resulted from that society's choice, wills and wants (as the bourgeois theorists believe), or from an overwhelming dominance, tantamount to control, which the bourgeoisie has in that society [26]. Agreeing with Marx, I believe that classes have different ideologies which also appear in different forms of culture.

> Upon the different forms of property, upon the social conditions of existence, rises an entire superstructure of distinct and peculiarly formed sentiments, illusions, modes of thought and views of life. The entire class creates and forms them through tradition and upbringing [27].

But one of them, the ideology of the dominant class is the dominant ideology. As Marx and Engels indicated

> ...*the ideas of the ruling class* are in every epoch the ruling ideas, i e, the class which is the ruling *material* force of society, is at the same time its ruling intellectual force [28].

But this 'ruling' does not imply that the working class ideology is either non-existent or absorbed in the bourgeois one. Nor does it imply that a clear-cut division exists between the two ideologies with a well delineated boundary between them. Class struggle is continuously taking place with victories and defeats which influence both ideologies. For example, I have already indicated in previous pages how bourgeois values appear in the working class. An example is when the working class accepts the belief that the nature of work is determined by industrialisation. And vice versa, the rhetorical (although not actual) acceptance by the bourgeoisie of democracy as a part of dominant ideology was forced by the working class on the bourgeoisie, when the latter social class needed an alliance with the former in its struggle against the aristocracy, then hindering the rise to power of the bourgeoisie [29]. In other words, democracy was not a set of values and practices spontaneously created by the bourgeoisie, but, rather, an ideology forced on the bourgeois ideology by the working class. The bourgeoisie has always fought by all means the expansion of democracy, including the expansion of universal suffrage, freedom of association, freedom of the press and many other freedoms which the working class has had to win with great sacrifice and not without heroic struggle.

In summary, there is, under capitalism, a dominant ideology which appears in all institutions including the institutions of science and medicine.

Class dominance in scientific medicine

How does the bourgeois vision of reality appear in science and medicine? In many ways. Let us outline some of them.

Dichotomy of Science versus Ideology

An extremely important view within bourgeois ideology is that there is a clear-cut dichotomy between science and ideology. Actually, science was the creation of the nascent bourgeoisie and was contraposed to religion (seen as the ideological expression of aristocratic dominance) which it was considered to transcend and supersede. Science was supposed to be a new global vision of reality which would rationalise and legitimise the new bourgeois social system. Galileo, one of the founders of the scientific revolution—and who, incidentally, was working as an advisor to coal owners on how to increase the rate of exploitation of coal miners [30]—established the basis for the creation of new knowledge based on what was called objective observation and not on theology. And that dichotomy, objectivity versus subjectivity, science versus ideology, has lasted throughout the history of science. Science was thus perceived as a body of neutral and value free knowledge built in a painstaking and linear process in which each new scientific dscovery was built upon a previous one. Science and technology became part of the forces of production and as such, their development was considered to be intrinsically positive. According to bourgeois ideology, science and technology (and the process of industrialisation which they determine) were forces of progress, determining, almost in a fatalistic way, the nature and shape of society. The most recent versions of those positions are the ones taken by Daniel Bell [31] and others, who indicate that power has shifted from the owners of the means of production to the managers of the process of that production and, more recently, to the producers—the scientists—of what is perceived as the most important ingredient of production, i e, science and technology.

It is worth stressing here that the bourgeois interpretation of the value free character of science has also appeared within the labour movement, particularly since Stalin [32]. As Sweezy and Bettelheim [33] as well as Lecourt [34] have eloquently indicated, the forces of production, including science and technology, under Stalinism were perceived as neutral. Their development was perceived to be a primary condition for the achievement of a change in the relations of production at a later stage. That change in the relations of production was perceived as needed, because they were retarding and hindering the full development of the forces of production. [Social relations of production are the relations which exist in a given process of production between the owners of the means of production and the producers, a relation which depends on the type of ownership, possession, capacity for allocating and designing those means of production and the use of the products of that process of production. Forces of production are the forces, instruments, labour and knowledge which are organised to produce goods and services in any society. How the forces of production are organised, designed and related among themselves is deter-

mined by the social relations of production.] In this dichotomy—forces versus relations of production—the forces of production were primarily understood as the instruments of production, and their development was considered to be the primary motor of history. The point that has to be stressed here, and Lecourt ignores it, is that instrumentalist understanding of forces of production already appeared in Lenin. It was Lenin who believed that the Western forces of production (including Taylorism) should be imported and put to proper and better use by the Soviet revolution. Lenin was an enthusiast of Taylorism. As Claudin-Urondo has indicated, Lenin conceived science and technology as neutral entities, rather like tools, the function of which can be changed depending on the use being made of them [35]. It should be pointed out that immediately after the October Revolution, a massive democratisation in scientific institutions, such as in the medical ones, took place with changes in the pattern of class control of medical schools and other scientific institutions and with changes in the class origins of the medical profession and other scientists. These changes had quite an impact in redefining the nature of those institutions, and in redefining the process of creating scientific knowledge. That democratisation had a very significant impact in redefining the nature of both scientific institutions and science itself.

The priorities within medicine, for example, changed quite substantially, and initial changes in the understanding of medical knowledge started taking place. This process of democratisation, however, was strongly reversed later on, in particular under the Stalin regime. Class control of scientific institutions and class origin of the scientists were reversed most dramatically under Stalin, giving strong political weight to the experts (scientists and technocrats) who became the controllers and administrators of scientific knowledge, closely supervised by the party apparatus. In this scheme of things, the development of the USSR meant primarily the fantastic growth of the forces of production (including science and technology) and the better redistribution of the product of that process. But it did not change the process of production and work nor those forces of production. The nature of science and technology (and, as I have shown elsewhere, medicine) did not change under Stalinism [37].

Foces of production are not neutral, however. They carry with them the social relations of production which determine them. In other words, a factory or a hospital is not a neutral institution. It is a hearer of power relations which determine how work in the institution is done, by whom, and with what type of instruments. How the work process takes place in these and other institutions in society is determined by the power relations existent in that society. It is not the process and forces of production which determine the social division of labour (as the theorists of industrialism postulate), but, rather, it is the social division of labour, its concomitant power relations and the ideological relations which those power relations carry, which determine the forces of production including science and technology. The power relations in society appear also *within* scientific knowledge, and the bourgeois ideological dominance appears and is being reproduced in the production of knowledge itself. The dominant ideology reproduces itself in scientific knowledge. And this reproduction takes place, not only by selecting the subjects of inquiry, but also by choosing the method of inquiry, and the relations which the researcher or inquirer has within the overall process of production. Needless to say, this position—that bourgeois ideology reproduces itself in science and thus science is value loaded and not value free—is continuously denied by scientists and other bourgeois theoreticians. Science appears as the epitome of objectivity. And all series of ideologies rush to be called sciences to gain legitimacy and credibility in bourgeois society. Not only natural sciences, but a long list of ideological positions appear with the sanction of sciences, e g, business sciences, management sciences, social sciences, political sciences, economic sciences. Sciences become the newly accepted vision of reality which would enable the citizenry to cope with the world in a better fashion. All types of ideologies are thus made compulsory subjects in our scholarly institutions, from schools to academe, provided they are presented as sciences (i e, "value free and neutral"). In this way, while the parents of a ten-year old child would strongly object to having him/her subjected to compulsory classes of a certain religion or certain ideology, they would not object, or would not be given the right to object, if that subject were, or is, presented as a science, e g, economic science. Science becomes that magic word which allows the transformation of value loaded knowledge into a value free one. Thus, the dichotomy of science/ideology constitutes a most powerful ideology for the reproduction of bourgeois relations.

Division Between Experts and Laymen

Once this dichotomy of science/ideology is established, then we have to ask what is science? And the bourgeois response is that science is an objective body of value free, classless and universal knowledge, based on testable observations of reality. As such, the production and reproduction of scientific knowledge takes place place in scientific institutions by individuals who—in the overall social division of labour—have been assigned the task of producing and reproducing that knowledge, i e, the scientists. *Science then becomes what scientists—a small group of individuals in society—do. And scientific medicine is what medical scientists and practitioners do.* Needless to say, all systematic knowledge which is produced outside those institutions, and by individuals other than scientists, is not considered science. According to this criteria, the documents produced by research groups in occupational medicine that concluded in the thirties, forties, fifties and even sixties in the United States that there was not a relationship between black lung and coal mining were supposed to be "scientific documents and conclusions" and thus trustworthy. On the other hand, the knowledge accumulated by generations of coal miners—knowledge which appeared in their culture as folk songs, popular writings, etc—that the work in coal mines was destroying coal miners' lungs was dismissed as cultural, folksy, ideological and in summary untrustworthy. Thus, knowledge is legitimised only and exclusively when it comes from the scientists. This dichotomy of science/ideology then appears operationally as the dichotomy of expert/non-expert in which the control of the definition

of science and expertise is delegated by the dominant bourgeoisie to another class, the petit bourgeoisie or professionals who carry on that task, namely, the production of knowledge under the hegemony of bourgeois ideology.

This last point of delegation raises the question of the autonomy of science. Can science become autonomous from the dominant ideology? My answer is yes and no [37]. Yes, *in the limited sense* that once established, it has an internal logic of its own, i e, the logic of that discipline or branch of science. No, *in the major sense* that scientific knowledge is continuously growing under the dominance of bourgeois ideology. In other words, scientific knowledge and scientific situations are under bourgeois dominance, and that reality shapes the nature of that knowledge. For example, and as I will explain in the next section, bourgeois dominance in medicine established a vision and an understanding of disease in which that disease was seen as the lack of equilibrium within the different parts—organs and humors—of the body. This specific understanding of disease generated a medical knowledge which developed autonomously. But the division of labour within medicine—specialisation—developed according to the bourgeois understanding of disease. Consequently, this internal logic of scientific medicine led to the creation of specialities which follow organistic bases: cardiologists, nephrologists, etc. Thus, medical knowledge developed according to its internal logic given by that bourgeois conception of disease. In other worlds, *bourgeois dominance always determines in the ultimate instance what occurs in the realm of scientific knowledge*[38].

How Bourgeois Ideology Appears in Medical Knowledge

In the previous section, I indicated how the bourgeoisie's definition of science—knowledge produced by an elite, the scientists—appears and is reproduced in our society. In this section, I will discuss how that bourgeois ideological dominance over science appears in the production of knowledge. But, first, let us clarify what we mean by production of knowledge. It is the process whereby a perception of reality is transformed into a specific product, i e, knowledge, a transformation which in science takes place by intellectuals whose primary instruments of work are the theories and methods of science. Scientific theories in each science consist of a group of concepts which belong to that specific branch of science (e g, the law of gravity in physics). Scientific method is the way in which those concepts are used. Both theory, and method allow that intellectual—the scientist—to transform this perception into knowledge [39]. Needless to say, this knowledge is being reproduced, not in abstract but in specific institutions, subjected to class hegemony and by scientists whose very specific visions of reality are moulded by the ideology of the dominant class (the bourgeoisie); their own social class (the petit bourgeoisie); their race; their sex; their discipline; their political position, among others. The scientist does not leave all those ideologies outside the walls of the scientific institutions. The scientists carry those visions of reality in the production of knowledge as well. That production is submerged into and is part and parcel of those ideologies, of which the most important one is the ideology of the dominant class or bourgeoisie.

How does this bourgeois dominant ideology appear in medicine? By the submersion of that medical knowledge into the positivist and mechanistic ideology which typifies science created under the hegemony of the bourgeoisie, and which I would call bourgeois science. Actually, positivism and mechanism appeared as the main ideologies of the bourgeoise in the nineteenth and twentieth centuries in Europe with the works of Hume. Comte, and, later on, Durkheim. According to positivism, science must focus on specifics to build up the general, looking at social phenomena as if those phenomena were natural, ruled by natural and thus harmonious rules. As Durkheim indicated, positivism reduces social phenomena to natural phenomena [40]. And within that interpretation, causality was supposed to be explained by association of immediately observable phenomena.

Positivism appears in medicine in its definition of disease as a biological phenomenon caused by one or several factors which are always associated and observed in the existence of that disease. For example, in one of the most widely used textbooks on epidemiology in the Western world, MacMahon describes epidemiology—the science of studying the distribution of health and disease—as an extension of demography, and he defines that distribution according to age, sex, race, geography, etc, giving major importance to those individual characteristics which are either biological or physical. Moreover, in explaining causality, MacMahon quotes Hume and indicates that causality can only be seen but not explained, since we can only focus on the degree of associations between several subsequent events [41].

A legitimate question at this point is to ask how that positivist conception of medicine came about. To answer that question, we have to go to the origins of scientific medicine as we understand it today. And these origins appeared primarily in the nineteenth and twentieth centuries during the same time that science appeared as a recognised and legitimised area of endeavour. Those were times of large social upheavals and unrest in Europe. Capitalism was being established, changing from a mercantile system to an industrial one. Those changes had an overwhelming importance in defining the nature of medicine as well as that of health and disease. One version advanced by the working class and by the revolutionary elements of the bourgeoisie, such as Virchow, saw disease as a result of the oppressive nature of existent power relations of society, and thus saw the intervention in smashing (the revolutionary) or modifying (the reformist) those power relations. Epitomised by the dictum that medicine is a social science and politics is medicine in a large scale (Virchow), its best representative was Engels whose work on the conditions of the working class in England was a dramatic document showing the political nature of the definition and distribution of disease. His solution was written, with Marx, in the *Communist Manifesto*; with his call for revolutionary change, where the first steps included the actual democratisation of political, economical, and ideological spheres in society. This version

of medicine, however, did not prevail. The bourgeoisie, once it won its hegemony, supported another version of medicine that would not threaten the power relations in which it was dominant. The bourgeois social order was considered from then on as the natural order where its class rules would be veiled and presented as rules of nature. Accordingly, disease was not an outcome of specific power relations but rather a biological individual phenomenon where the cause of disease was the immediately observable factor, i e, the bacteria. In this redefintion, clinical medicine became the branch of scientific medicine to study the biological-individual phenomena and social medicine became that other branch of medicine which would study the distribution of disease as the aggregate of individual phenomena. Both branches shared the vision of disease as an alteration, a pathological change in the human body (perceived as a machine) caused by an outside agent (unicausality) or several agents (multicausality). This mechanistic vision of health and disease is still the prevalent and dominant interpretation of medicine. Witness a recent deifinition of health and disease in Dorland's Medical Dictionary in which health is defined as "a normal condition of body and mind, i e, with all the parts functioning normally"; and disease is defined as "a definite morbid process having a characteristic strain of symptoms—it may affect the whole body or any of its parts, and its etiology, pathology, and prognosis may be known or unknown" [42]. From this mechanistic understanding of health and disease, it follows that the division of labour (specialisation) in medical knowledge and practice has evolved around component parts of that body machine, i e, cardiology, neurology, etc.

A related point is that the mechanistic interpretation of medicine was built upon knowledge which had been generated previously (blood circulation by Harvey in 1628; microscope by Van Leeuwencheck in 1683, and others). But it would be erroneous to consider scientific medicine as a mere linear evolution starting with those previous discoveries. *These discoveries did not lead to or create scientific medicine.* Rather, it was the victory of the industrial bourgeoisie which established that positivist conception of science and of medicine. The fact that those previous discoveries were used and presented as the originators of scientific medicine was due to the change in the correlations of forces and subsequent victory of the bourgeoisie as the dominant class under industrial capitalism. In this respect, scientific medicine was not the linear growth of previous knowledge. Rather, and to use a Kuhnian term [43], a shift of paradigm took place, establishing a new paradigm which carried a new, a positivist, vision of disease which added to what had already been built. This point has to be repeated, because it is part of the bourgeois understanding of scientific knowledge that this knowledge evolves linearly with "new" discoveries based on previous ones, as if these discoveries were the bricks on which the scientific building was constructed [44]. According to this understanding, science and technology grow and determine the nature of power relations in our societies; and the history of humanity becomes divided into stages determined by the discovery of new technologies which shape the nature of that historical stage, e g, industrial revolution, nuclear age, etc. Science and technology thus appear as the "motor" of history. But, as Braverman [45] among others, has shown, the so-called "technological breakthroughs" were not the ones which established new social orders—rather, the reverse was the case, i e, a new correlation of forces used those *already known* technological breakthroughs which were, later on, presented as the actual cause of that change in the social order. But those breakthroughs or scientific and technological discoveries were used and put forward by new correlations of forces. The victory and subsequent hegemony of the bourgeosie, for example, was the one which stimulated science, including scientific medicine. It was this political reality which determined the advancement of the positivist and mechanistic conception of medicine, health, and disease. In other words, the power relations which existed under the bourgeois order were the ones which determined the form and nature of medicine. It led to a scientific inquiry where the aim of that inquiry was the discovery of the cause or micro-organism, and the instrument of that inquiry was the microscope. By focusing on the microcausality of disease, however, science ignored the analysis of the macrocausality, i e, the power relations in that society. Scientific inquiry in medicine developed into a search for the cause: bacteria, parasite, virus or, later on, the toxic substance. Consequently, the strategy of intervention was the eradication of what was supposed to be the cause of disease. Needless to say, that interpretation of disease and of medical intervention was supposed to be presented and perceived only and exclusively as scientific and certainly not political. The dichotomy of science vs ideology was made quite clear and explicit. The alternative explanation, i e, the assumed "cause" was a mere intervening factor and the actual cause of disease resided in the power relations of that society, was dismissed as political, anti-scientific and in some circles perceived also as needing "eradication". In a report of The Rockefeller Foundation on Health in Latin America, it was stressed that there was a great need "to eradicate disease in vast areas of rural South America, otherwise the virus of the tropics will soon attack the metropolis, a virus that can be biological or, even worse, *political*"[46]. A clear call for scientific eradication of undersirable ideological explanations! The limitations of this strategy of eradication based on the unicausal interpretation of disease led to the later strategy of control instead of eradication. But, most importantly, that unicausal explanation was, and is, increasingly abandoned by the multicausal explanation of disease. Disease was later on supposed to be determined by several causes, some of which included socio-economic causes. But these socio-economic variables were added to other causes as if they were independent variables, independent of each other. Social class thus appears as one more variable which may be indirectly associated with the direct and most important explanatory variables. But this limitation of the concept of causality to the immediately observable association between disease (e g, cancer) and other specific events such as smoking, occupation and others is intrinsically limited since it leaves the key question unexplained, i e, how those different events are related. As a recent report on cancer research published by the United States government indicates, "a major defect in most cancer

research in the Western world (and I would add other worlds as well) is that most cancer research has been based on looking for a single or multiple cause, ignoring the interrelations among those assumed causes"[47]. What this report touches on is that the primary cause for our ignorance of the causality of cancer has been a limited understanding of causality, a limitation that comes from the positivist understanding of knowledge which I have indicated. By focusing on statistical association, positivists are touching on the appearance but not on the reality of the phenomena. In other words, what are presented as "causes" are not the actual causes [48]. The epistemological problem thus created cannot be solved either by indicating that those assumed causes are intermediate causes, part of a network of causalities whose linkage among the knots (intermediate variables) can be measured by statistical associations. The actual way of studying disease in any society is by analysing its historical presence within the political, economic, and ideological power relations in that specific social formation. And by this, I do not mean the analysis of the natural history of disease but rather the political, economic, and ideological determinants of that disease, determinants resulting from the overall power relations which are primarily based on the social relations of production. These power relations are the ones which determine the nature and definition of disease, medical knowledge, and medical practice. The understanding of the evolution and causality of black lung in the United States, for example, cannot come from an analysis of the natural history of black lung. It has to come from an understanding of the class power relations in the United States and how the class struggle shaped both the scientific definition, recognition, and knowledge of black lung in the United States and the actual production and distribution of that disease.

What I have said so far should not lead, however, to the opposite conclusion that the inquiry should be limited to the discovery of associations between specific power relations and disease. In other words, it is not enough to establish an association between specific forms of capital accumulation or, say, economic cycles and certain diseases. It is not enough to say that capitalism, for example, determines a certain disease profile. It is necessary to research how those power relations appear, how they are being reproduced, and how they determine the nature of death and disease in society. The different categories of analysis such as world of production, consumption, and legitimation need to be understood in detail and related to the specific mediating mechanisms that those sets of relations have with the apparent "causes" of disease. In other words, what is needed is not the incorporation of the social as mere additions to 'environmental' variables which act on the individual; but, rather, what is need is an understanding of how diseases mediate social relations, i e, how the social power relations determine both the social and physical environment and the individual's experiences within that environment, including disease. Actually, there is an urgent need to break with that new dichotomy of individual/environment which is as false as the old dichotomy of mind/body.

Consequently, the terms of the discourse have to be changed. Instead of using the dichotomy, individual/environment, we should analyse how social power relations determine disease. Taking black lung as an example, we have to understand how the social power relations defined and determined the working and living conditions of the coal miners; how the workers struggled against them; and how, in that context medical knowledge and medical practice came into being to obfuscate or clarify the nature of the damage inflicted on the coal miners. Needless to say, in the process of this struggle, individuals and classes have different knowledge, perception, and ideologies regarding their own experiences, which leads me to the last point I want to stress, namely, the existence of bourgeois science and working class science.

Bourgeois Science or Working Class Science: Utopia or Reality?

Knowledge is accumulated, stored, produced, and reproduced in the daily practice of people's lives. And the nature of that knowledge varies considerably, depending on the social class practices. Each social class has its own practice which appears in its own ideology and culture, i e, a vision of reality; and vice versa, that ideology and culture also appear as class practices. Thus, there is a bourgeois ideology, culture, and knowledge given and reflected in bourgeois practice. And there is a bourgeois knowledge and a working class knowledge. Both classes have different practices which generate different types of knowledge. The knowledge (legitimised under the name of science) produced by the bourgeoisie and reproduced in scientific institutions, which denied, for example, that there was any relationship between work and cancer, was bourgeois knowledge aimed at reproducing bourgeois power and practices. The knowledge (perceived in scientific discourse as 'hot air', 'folklore', or populist culture) produced by the working class and reproduced in its cultural forms, affirming that work was killing them, was, and is, working class knowledge based on experience. From this, I conclude that there can be two types of sciences: a bourgeois science and a working class science, each one based on different sets of knowledge and practice. To deny the above dichotomy is to assume a classless nature of knowledge, and thus a knowledge absent of practice. These two different and even conflicting visions of reality, the bourgeois and the working class visions, are not separated by clear-cut boundaries without one influencing the other. Through the process of class struggle, the working class develops and imposes its own vision of reality on bourgeois science: witness current interest in researching the relationship between work and cancer. This new development is due to a large degree to working class and the general population's outcry on the damage being created at the work place But, still, the hegemony which the bourgeoisie has in all scientific institutions explains the nature and bias of that response, a bias reflected both in the choice of areas to be researched and the means and ways of researching it. The scientist does his/her job in institutions *with* the bourgeoisie. In this respect, the scientist is, to use a Gramscian term, an organic intellectual of the bourgeoisie who explains the reality with and for the bourgeoisie. This relationship of scientist/bourgeoisie is overwhelmingly clear in the United

States where most research is sponsored either by private foundations or by the state where capital's representatives are extremely powerful and influential.

The alternative, the socialist alternative, would be to carry on scientific inquiry *with* the working class, analysing reality based on the extremely powerful knowledge given by the daily practice of the working class, and *under* the direction of the working class.

In this I see a great area of struggle: to democratise the institutions and to change the patterns of accountability of intellectual workers: and to work together with manual workers until eventually that dichotomy of intellectual/manual will be questioned and diluted. No doubt, this change of accountability requires a tough struggle: the one of democratising our institutions. In this respect, it was a great victory for the Italian working class when it won the right to control occupational health services at the factory level and also when it won the right to undertake research at the factory with the researchers chosen by the workers. This is a clear example of how the struggle for democracy and for knowledge are one and the same.

Let me finish by saying that I am aware that many eyebrows will be raised when reading this section of my article. The nightmare of the Stalinist distinction between bourgeois science and proletarian science will undoubtedly be remembered. And the case of Lysenko will be immediately raised as a warning against those dichotomies. My answer to that legitimate concern is that the Stalinist version of proletarian science was not the science developed by the working class (which was not in power), but rather the version given by the Stalinist leadership of the party which identified proletarian science with dialectical materialism as defined and controlled by them. The fact that the agency of control was mislabelled proletarian science did not make that science proletarian, nor does it make the whole concept of class bound knowledge meaningless. That is the mistake of Lecourt [49]. It throws the baby out with the bathwater. There is proletarian knowledge and mass knowledge which will fully appear and will flourish unhindered when there will be mass democratisation in the process of the creation of knowledge with the deprofessionalisation of science, changing not only the class composition of scientists but, most importantly, the method and creation of knowledge, knowledge created not by the few—the scientists—but by the many—the working class and popular masses. As Gramsci once indicated, while all human beings are capable of being intellectuals, only a few are assigned that task. Similarly, while all human beings are capable of creating knowledge, only a few are given that task. Mass democratisation would imply a redefinition and redirection of that process of the creation of knowledge. *This process would not mean, of course, the absence of a division of labour. But it would mean a change in the power relations in the creation of knowledge with a dramatic expansion of the capability of creation of knowledge, with the working class and popular masses being the agents and not the objects of that knowledge.*

In other words, science is a social relation and, as such, the key operational issue is not only *for* what class that knowledge is being produced (the uses of science) but, most importantly, *by* what class and its related question, *with* what class (the class character of sciences) that knowledge is being produced. The failure to understand the importance of these points explains the overabundance of references in which authors continue to search for the perfect socialist scientific method that would enable them to find the socialist truth. That search is not only a theoretical but a practical task as well. *And it requires a political and professional commitment to the working class.* In other words, it requires to break with the role to which the scientist is assigned under bourgeois order and to ally himself/herself with the working class, not to lead that class but to assist it in its potential for human liberation and creation of knowledge. Let me try to be very specific and advance an example of the proposed relationship with which I have experience, namely, two different ways and approaches to find reality at the work place.

One would be the bourgeois or positivist approach to find the nature of a specific health problem (e g, toxic exposures) in a factory and a way of solving it. The 'expert' (epidemiologist or any other social scientist) usually called by management would (1) establish a *hypothesis de travaille* based on his previous knowledge of that problem. Needless to say, it is part of the scientific ideology that he should be "objective" and unemotional about the issue under study. His only aim is to find the truth. As such, he would have a "healthy skepticism" about any subjective statements or situations, relying more comfortably on facts, and very much in particular on quantifiable facts: (2) try to obtain as much information as possible from each individual worker in order to ascertain the facts. Through questionnaires, interviews, medical records, etc, he would try to obtain from each worker as much 'objective' and quantifiable information as he could get and find relevant. He would also try to locate the collective dimensions of the problems by adding up the individual problems; (3) last but not least, he would try to test the hypothesis by statistical manipulation of quantifiable (objective) information.

He would finally submit a report to management's implementation. In that *modus operandi* of research, workers appear as passive subjects of research remaining in the background and not in the forefront in the analysis and solution of the problem. This method of inquiry and data gathering is the most frequent tool used in social science research. The citizens, workers, blacks, women, etc, are studied individually, providing information through key instruments of inquiry, questionnaires or interviews. In all these approaches, three ideological positions—presented as scientific conditions—are that (1) theory and fact are two separate entities of which the former is supposed to be built upon the analysis of the latter; (2) the expert, the holder of proper methods of inquiry, is the active agent while the studied object the worker or citizen is a passive one, i e, the mere provider of information; and (3) collective information is the aggregate of individual information. The process and findings of this scientific inquiry are, of course, presented as objective and value-free (universal and classless) [50].

It is not surprising that in the late sixties, when many anti-authoritarian movements appeared in the Western capitalist world, many of those analysed passive objects—workers,

blacks, women—rebelled against that science and against those scientists. At that time, alternative relations of production of knowledge were established. In many Italian and Spanish factories, for example, workers committees and assemblies were established which rebelled against the type of science that was carried out in those factories. From then on, they did not allow any scientists to come inside the factory and ask them questions [51]. Instead, they developed another approach in which the process of inquiry was carried out under their direction. Consequently, a new production of knowledge took place in which (1) all information regarding the specific health problem was (and is) produced and discussed collectively with the correct understanding that a collective problematic is far more than the mere aggregate of individual problematics. Moreover, workers assemblies have a collective memory and experience that puts their perspective. They know what is going on and what has been going on in that factory process and environment for a long time. And they have first-hand experience with what that problem has meant in their collective and individual health and well-being. Out of their collective discussion, they develop a hypothesis of what is happening in the factory regarding the specific health problem. In that process of generating and collecting data, subjective feelings, anxieties and uneasiness are the propelling forces which guide all processes of gathering both objective and subjective data; (2) the workers call in scientists of their own choosing to assist them in the collection and analysis of whatever data the workers feel needs study. In this process, the workers keep a healthy skepticism about the meaning of science, expertise, and objective information. They scrutinise all objective data, and through the process of mutual validation, they accept the value of the data depending on how it fits within their own perception of reality. It is worth stressing here that many years of exposure to occupational medicine has taught workers the lesson that science is not value free knowledge but very value loaded knowledge, reflecting the values of institutions where science is created and the values of scientists who create that science; (3) once agreed collectively on the nature of the problem, the workers demand to participate collectively in the solution of that problem.

This collective production of knowledge based on collective practice is an alternate form of production of knowledge to the individual production of knowledge, characteristic of the bourgeois model. Needless to say, it puts the scientist in a *different social relation with the subject of study*. It puts him/her in an assistant role with his/her information and knowledge being just a part of a broader and more important knowledge which is created by the practice of the working class. Needless to say, the majority of scientists would oppose that diminution of their protagonism, since it would diminish their power. Many arguments are likely to be used against that change of power relations—ideological arguments presented as scientific arguments to defend specific class interests. The bourgeoisie and the majority of profesionals will oppose that change by every means possible, including sabotage. Still, that the majority of professionals would oppose change does not mean, of course, that a minority within those professions cannot play a very important role in taking sides with the forces for change. But in that process of changing class alliances, they will have to change, not only their roles (from leaders to assistants) but also their methods of work and the social and political context in which they use them. And it will be in that new realm of practice that new social relations and a new science will be created.

Struggle for Democracy

I have shown in the three sections of this article how bourgeois ideological dominance reproduces dominant/dominated relations in the spheres of production, politics and science, including medicine. Also, I have shown how the working class rebels against this bourgeois domination in a continuous process of class struggle, which leaves its mark on all those spheres. The class struggle takes many different forms, but aims at changing and/or breaking with those patterns of domination which oppress the working class and popular masses. It follows, from what has been said, that their liberation requires the breaking of that pattern of control where the few and not the many decide on the nature of our societies. And, by democratisation, I do not mean the mere existence of a plurality of parties and existence of civil rights. I mean far more than that, I mean a profound change in the pattern of control of the spheres of production, consumption, representation, ideological discourse, and scientific endeavour where the many and not just the few control. Specifically, democracy cannot be seen as limited to the passive and indirect realm of representative politics. It has to be seen, as Marx and Engels said, as the massive, active and direct involvement by the collectivity of workers and citizens in the governance of social institutions where they work, reside, study, enjoy themselves and are being taken care of. As Hal Draper has indicated, the greatest contribution which Marx and Engels gave to the history of humanity was to reveal the clear symbiosis between socialism and democracy. As he put it, "Marx's socialism (communism) as a political programme may be most quickly defined, from the Marxist standpoint, as the complete democratisation of society, not merely of political forms" [52]. The struggle for democracy needs to combine struggles in the institutions of representative democracy, where power is delegated to full-time representatives—the "experts" in politics—with, most importantly, struggles to achieve forms of direct and mass democracy where power is retained by the users and workers in all societal institutions. For example, in order to change not only the priorities but also the nature of medical and scientific institutions, there is a need to win control of those institutions, not only indirectly through elected officials in the realm of representative democracy, but most importantly, through direct and assembly type of democracy where workers, employees, users and communities control those institutions. In other words, a socialist transformation will not occur without a massive and direct participation by the majority of the population in that process of transformation.

To sum up, there is a need for the working class, through its different instruments and forms of struggle, to aim at a massive democratisation of our societies, understanding democracy, not as an exercise in voting every so many years,

but, most importantly, as a direct form of participation on a daily basis by the working class and popular masses in all economic, political and social institutions (including the medical and scientific institutions). It is only in this way that the democratisation of our institutions will imply a massive transformation of the majority of our working populations from being passive subjects to active agents in the redefinition of those societies, a transformation that takes place as part and parcel of their becoming the agents and not the objects of history.

References

1. The Trilateral Task Force on the Governability of Democracies. *The Governability of Democracies.* Trilateral Commission, New York, May 1975.
2. By 'Capitalism' I mean a mode of production in which a class, the capialist class, extracts as much labour power from each worker as possible; labour power that is needed to (1) put the means of production (owned, controlled and possessed by the capitalist class) to work; and (2) produce value, including profit. Labour power is the human energy and competence that the worker provides to enable the means of production to work. It is usually referred to as work.
3. A most representative view of this position is Marcuse H. *One Dimensional Man.* Beacon Press, Boston, 1975.
4. Ehrenreich J, Introduction. In *The Cultural Crisis of Modern Medicine* (Edited by Ehrenreich J.) Monthly Review Press, New York, 1979. After having been criticised for his deafening silence about the working class struggles around health and its consequences on the redefinition of medicine, the author added "coal miners struggle" as a mere perfunctory note to that introduction of his volume without actually referring to it. As with many other US radicals. Ehrenreich ignores the dramatic and continuous struggles around health related issues that are being carried out by the US working class.
5. See Marshall D. The miners and the UMW: Crisis in the reform process. *Social. Rev.* 40/41, 65, 1978, for a detailed account of those struggles.
6. The struggles against the nature of work under capitalism occur, not only because of the actual damage imposed on the worker at the work place, but also because of the harm created to the workers and their dependants in all spheres of their lives.
7. See Braverman H. Labour and monopoly capital. In *The Degradation of Work in the Twentieth Century.* Monthly Review Press, New York, 1974. Also, for an analysis of how the process of class struggle has shaped the form of bourgeois dominance in the process of work, see Friedman A. L. *Industry and Labour, Class Struggle at Work and Monopoly Capitalism.* Macmillan, New York, 1977.
8. Bosquet M. The prison factory. *New Left Rev.* 73, 23, 1972. Also, see Linhart R. *L'etabli,* Minuit, Paris, 1978.
9. Quoted from Doye R. J. *Management Accounting,* 1970.
10. Class dominance is a process of continuous endeavour on the part of the capitalist class or bourgeoisie to maintain, regain, strengthen and extend their interests in all economical, political, ideological and cultural spheres of society over the ones of the dominated class or working class. In this article, dominance and hegemony are used interchangeably.
11. Class struggle is the conflict among classes that appears in all economic, political, ideological and cultural spheres of society and that takes place in the pursuit of their interests. Under capitalism, the main conflict is between the capitalist class and the working class.
12. Gramsci A. *Quaderni del Carcere,* p 30. Einaudi, Turin, 1978. It is worth stressing that the unions are, of course, very important instruments of struggle by the working class. But the focus of those struggles on economic issues transforms them into limited and limiting instruments for revolutionary change, i e, change from one to another mode of production.
13. Marx K. *Grundisse.* Penguin Books, London 1973.
14. See Kotelchuck D. Asbestos research: Winning the battle but losing the war. *Hlth PAC Bull.* 61, 1-32, 1974. Also Epstein S. *The Politics of Cancer,* pp 86-87. Sierra Club Books, San Francisco, 1978.
15. Ginzberg E. *The Limits of Health Reform: The Search for Realism,* p 3. Basic Books, New York, 1977.
16. See Greenberg E. *The American Political System. A Radical Approach.* Winthrop, Cambridge, MA, 1977.
17. By means of production, I mean not only the means that the workers use for their work but also the infrastructure of production and distribution that enables the produced goods and services to be used and consumed.
18. For an expansion of this position, see Navarro V. *Dictatorship and Democracy. Meanings and Implications for Class Struggle* (mimeo), Johns Hopkins University, Baltimore, MD, 1979.
19. Etzione A. Risk at the work place. *The Washington Post,* Dec. 28, 1978.
20. Hart Poll. *Common Sense,* Vol 3, 1975. That lack of trust of American people in the US political institutions represents a major crisis of legitimacy of bourgeois ideology in today's US.
21. Contrary to bourgeois ideology that postulates that the state apparatuses are neutral and can be used undistinctively by any class or group, I believe that the state's apparatuses reflect the power relations of the whole of society and thus are under the dominant unfluence of the capitalist class. That dominance explains its composition (the class position of the top echelons of the state personnel), its structure and its function (i e, to reproduce the capitalist relations). For a further expansion of this position, see Part III, "State power and medicine" of Navarro V. *Medicine Under Capitalism.* Neale Watson, New York, 1978.
22. Two examples of that perception are Tudor Hart J. The point is to change it. *Med. in Soc.* 4, 1979, and Figlio K. Sinister medicine. *Rad. Sci. J,* 9, 47, 1979. Although different in their political position, they both share that vision of the NHS as a socialist island in the capitalist state. J.T.H. reduces socialism to a juridical-political category, i e, the nationalisation of the health sector. K F reduces socialism to the absence of market relations and to the mechanism of societal allocations done by the state for the "benefit of society". In that vision, socialism is defined by the relations of exchange, not by the relations of production. Socialism, however, is a social formation in which the working class and its allies are the dominant class. Thus, socialist control is working class control.
23. Navarro V. *Class Struggle, the State, and Medicine.* Martin Roberston, Oxford, 1978.
24. Kirschten D. Risk assessment. How much is a life worth, *Nat. J.* 7, 252, 1979. Also, for an excellent account of struggles in the US to protect the workers against the risky environment, see Berman D. *Death on the job.* Monthly Review Press, New York, 1978.
25. Navarro V. The crisis of the Western system of medicine in contemporary captalism. *Int. J. Hlth Serv.* 8, 205, 1978.
26. Representatives of this position are H. Marcuse and most of the theorists of the Frankfurt School. A more recent example of this single society ideology is Kellner D. Ideology. Marxism, and advanced capitalism. *Social. Rev.*42, 37, 1978. It is worth mentioning that the first major works of Althusser (*Pour Marx* and *Lire le capital*) also carried that position of a single society ideology. Since 1968, however, Althusser has broken with that position. For an excellent and detailed critique of Althusser's position on this subject, see Sanchez Vazquez A. *Ciencia Y Revolucion.* Alianza Editorial, Mexico, 1978.
27. Marx K. The eighteenth Brumaire of Louis Bonaparte. In *Selected Works* (Edited by Marx K, and Engels F.), pp 117-118. Lawrence & Wishart, London, 1968.
28. Marx K. and Engels F. *The German Ideology,* p 64, Lawrence & Wishart, London, 1974.
29. Therborn, G. *What Does the Ruling Class Do When it Rules.* New Left Books, London, 1978.
30. Quoted in "Interview con suvlovico Geymont, El mito del progreso y de la neutralidad de la ciencia". *El Viejo Topo* 24, 13, 1978.
31. Bell D. *The Post Industrial Society,* 1977.
32. See Stalin J. *Dialectical and Historical Materialism.* A good critique of the work appears in Lecourt D. *Proletarian Science. The Case of Lysenko,* pp 110-111, New Left Books, London, 1976.
33. Sweezy P M. and Bettelheim C. *On the Transition to Socialism.* Monthly Review Press, New York, 1971.
34. Lecourt D, *op cit.*

35. Claudin-Urondo C. *Lenin and the Cultural Revolution.* Harvester Press, Sussex, 1977.
36. Navarro V. *Social Security and Medicine in the USSR. A Marxist Critique.* Lexington Books, Lexington, MA, 1977.
37. I am not using the categories of Yes or No in an either/or type of relationship. Rather, I am using them in a dialectical way, i e, that the autonomy of science takes place within a set of class relations that both influence science and are influenced by science.
38. The meaning of "ultimate instance" is that although conflicts may appear between scientific developments and capitalist relations, those capitalist relations tend to eventually impose themselves on those developments.
39. Harnecker M, *Los conceptos elementales de materialismo historico. Siglo med,* XXI, 3, 1977.
40. Durkheim E. *Las Reglas del Metodo Sociologicio,* p 50. La Pleyade, Buenos Aires, 1974.
41. McMohan B. *Principles and Methods of Epidemiology* (in Spanish: *La Prensa Medica Mexicana*), p 2. 1975. For an excellent critique of ideology within epidemiology, see Breilh J. *Critica de la Interpretacion Ecologica Functionalista de la Epidemiologia.* Universidad Autonoma de Miexico, 1977 (mimeograph).
42. *Dorland Medical Dictionary,* Saunders, Philadelphia, PA, 1968.
43. Kuhn T. *The Structure of Scientific Revolutions,* Univ. of Chicago Press, Chicago, IL, 1962.
44. For a critique of the concept of linearity in scientific knowledge, see Kuhn T. *op cit.* Also for an alive but not always rigorous discussion on this subject, see Feyerabend P. *Science in a Free Society.* New Left Books, London, 1978. Neither Kuhn nor Feyerabend touch on the socio-economic and political determinants of the scientific breakthroughs, a key subject which leaves their positions wanting. A further fault of Feyerabend's work is the key determinant role that he considers scientists have in initiating or stopping changes. For example, in examining the situation of blacks, chicanos and American Indians, he writes that "much of the spiritual misery of the remnants of non-Western culture in the US is due to this uninformed intellectual fascism of most of our leading philosophers, scientists, philosophers of science. . ." (p 207). The roots of the problems, however, are much deeper than Feyerabend seems to realise. He does not touch for example, on the key issues of why those 'fascist' ideas are the ruling or leading ideas.
45. Braverman H, *op cit.*
46. Quoted in Breilh J. *op cit.*
47. Bridford K. *et al, Estimates of the Fraction of Cancer in the United States Related to Occupational Factors.* Prepared by the National Cancer Institute, National Institute of Environmental Health Sciences and National Institute for Occupational Safety and Health, Sept. 15, 1978.
48. The fact that those assumed causes are only apparent,but not the real ones does not make them irrelevant. They may allow for a description but not for an explanation of reality. The vast array of empirical phenomena immediately observable in social life can only be explained if one analyses the social reality behind those appearances.
49. Lecourt, *op cit.*
50. For a critique of similar positivist approaches used in social science, see Scientific method in sociology. In *Sociology. Traditional and Radical Perspectives* (Edited by Sherman H J. and Wood J L.), pp 275-324. Harper and Row, New York, 1979.
51. For an analysis of the political and economic forces that determined the Italian experience and for a more detailed account of the process outlined here, see Assennato G and Navarro V. Workers participation and control in Italy. The case of occupational medicine. *Int. J. Hlth Serv.* 10, 217, 1980.
52. Draper H. Marx on democratic forms of government. *The Social. Regist.* 101, 1974.