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A case study

There is a substance called methyl isocyanate (MIC), which does not exist in nature but was introduced into the ecosystem by industry in the last century. A simple but very potent molecule (CH_3NCO), MIC is widely used in the manufacture of pesticides and herbicides because of its reactivity and deadly effects on living organisms. According to the website of the US Environmental Protection Agency:

MIC ... is an ester of isocyanic acid (HNCO). The parent isocyanic acid is a weak acid and exists in equilibrium with cyanic (HCNO) acid [the differences between the two HNCOs being in the spatial configuration of the atoms]. MIC's boiling point is yet to be clearly established. It is a highly volatile and inflammable gas; its vapors are denser than air; it is stable under dry and neutral conditions at room temperature but can violently react in the presence of acids, alkali, and the like. The carbon center in the isocyanate group is electron deficient (electrophilic) and therefore will react with electron-rich (nucleophiles), e.g.: water, alcohol, phenol, alkali, and the like.

Being denser than air, MIC vapor does not dissipate but settles on whatever is nearby. If exposed to water-bearing bodily tissues, it reacts violently, leading to changes that cannot be contained by the normal protective devices of the affected organism. The amount of energy released by the ensuing reaction swiftly exceeds the heat-buffering capabilities of the body. As a result, many molecules of service to the organism are degraded and/or thrown into disarray, while others that are toxic are formed. Put simply, the body suffers severe burns, especially of exposed tissues rich in water, such as lungs and eyes. Chest pain, breathlessness and

severe asthma result immediately. If the exposure is high, blindness, severe bacterial and eosinophilic pneumonia, or laryngeal edema and cardiac arrest follow.

What has been said so far would explain at the physiological level why a person who inhaled MIC, say, as she slept, could become deathly ill. Within this framework, we can say that MIC "causes" the illness and death. Needless to say, such an explanation would tell us nothing about another set of questions, namely, why was the sleeper in such proximity to MIC, and more, what is methyl isocyanate doing in the environment in the first place, at so close a distance that it interacted with bodies? To repeat, MIC does not exist in nature; and were it by chance to issue from some natural source like a volcano, its fabulous reactivity would ensure it a very transient existence. How, then, does MIC happen to be present so that bodies are affected by its violent chemical proclivities? In other words, MIC can cause the illness, but not itself. There needs to be a cause at a higher level of generality that brings MIC into existence and deploys it in certain ways. This property of being able to set other causes into motion is what we mean by the "efficiency" of a cause.

What "causes" MIC is the fact of being *produced*, through the conscious alteration of nature to serve human ends, in this case, industrial ones relevant to the development of agriculture. Industry, however, does far more than produce large amounts of strange substances; it also alters the human ecology, putting some people in its way, and serving others. Chemical science will be necessary to understand how MIC affects living tissue. Industrial production, however, understands science and nature in order to bring substances like MIC into the world, and to gather them for its uses, in this case, the manufacture of pesticides for the purposes of modern agriculture. To understand the full event, then, and not just the pathological effects on the organism, requires a grasp of the history and social relations of production, of its industrial turn, of the peculiarities of pesticide manufacture – and in this instance, of the reasons why so deadly a substance escaped sequestration and found its way into human bodies. And

if the poisoning took place in many lungs all at once, why they all happened to be there together to receive MIC's deadly embrace.

The reader will have doubtless gathered by now that I am referring to a very specific ecocatastrophic event: the release, on December 4, 1984, of 46.3 tons of methyl isocyanate from the factory run by the Union Carbide corporation, an American transnational with a pesticide-manufacturing facility in Bhopal, India. The gas escaped around midnight, and so it found the inhabitants of Bhopal, great numbers of whom lived close to the factory, sleeping. It is impossible to convey in words the suffering this caused. But some results can be enumerated: an estimated 8,000 people died on the spot and as many afterward, with over 500,000 injured, some 50,000 to 70,000 of those injuries permanent.¹ People were still dying, fifteen years later, at a rate of between ten and fifteen a month, and today, more than twenty years on, the dying and disability continue, and the ruins of the factory still deface the city and leach toxic materials into the environment.²

The worst industrial accident in history, Bhopal has become synonymous for the hazards posed to human beings by the industrial process, and an emblem for the ecological crisis itself. To understand the cause of Bhopal may give a window on the cause of the crisis, not in the sense that this is to be composed of horrendous accidents such as this, but because in Bhopal's magnitude all the elements of the crisis as a whole are concentrated. To comprehend Bhopal, however, we need to expand our thinking from the physiological dimension to include the role played by human agency, along with its ideological implications. Understanding this event, where not one but thousands of lives were mutilated, involves the judgment of competing claims and differing views of reality. Methyl isocyanate, as the active cause of bodily damage, is a mute killer without motive or interest in the outcome of its chemistry. When, however, we attempt to understand the causes of the accident at Bhopal, we need to think beyond the molecular level. For example, the element of money now enters the picture. It is not just the vast amounts at

stake as a result of the disaster – some \$3 billion in damages originally asked by the Indian government, with \$470 million finally agreed to by Carbide (plus \$50 million in legal fees, and \$20 million offered for construction of a local hospital)³ – but money's full power in human existence: in short, a whole social order is entailed, of power, and meaning, and the relationships between the actors of society. And now, too, we look for a kind of causation that would best comprehend these specifically human-ecological issues. But let us be concrete, and consider what happened at Bhopal that deadly night in 1984. Essentially, the questions come down to this: what was MIC doing in Bhopal in the first place? Why was it released in such a manner? Why were the people so exposed, and why so shabbily treated? And as for the responsible agents, what were the driving forces acting on them?

To the first question the answer is that Union Carbide put it there for its purposes, that is, the corporation caused the factory to be built where and when it pleased. In a literal sense, this is an absurd statement. Union Carbide is not a person who can put anything anywhere; and the actual people who immediately caused the MIC plant to arise in Bhopal were a great mass of laborers, architects, suppliers, etc., most of whom had no direct relation to the company but were hired by subcontractors. Yet we cannot claim that these workers built the factory except as the necessary but partial final human instrument, just as the tools in their hands were necessary but partial technological instruments. Therefore the answer to the question of what caused a factory, or any other social product, to be built would be: that which effectively organizes the social labor that went into it. And, since labor is the human faculty of making events happen, said cause, which organizes all the others, becomes efficient.

In a different kind of society, where workers controlled their productive life activity, or where, as in aboriginal society, the whole community did the same, we would be entitled to end our account of what caused the factory to arise with citation of the people who actually constructed it. But in our kind of

society that statement would be false, since under the regime of capital workers do not self-determine their activity. For an understanding, therefore, of the social organization of a vast number of individual activities we would have to turn to that which commands and controls them all in production, and in this case such an agent would have to be the Union Carbide corporation, despite the fact that it is headquartered thousands of miles away and served to express the interests of individuals who need never have set foot inside India, much less Bhopal.

We may say, then, that the workers, etc., were the instrumental causes of the factory at Bhopal, while the Union Carbide corporation was the efficient cause. That is, Carbide was the agent capable of organizing and fruitfully combining all the factors required for the production of the factory, and, once it had been built, for the manufacture, distribution, and sale of the products, including MIC as an intermediary product. In any complex phenomenon, many causal processes are at work. But insofar as the phenomenon functions as a whole, we may identify an overarching, integrating kind of cause that sets the instrumental causes into motion, regulates them, and directs them toward an end – and the alteration of which would be necessary to change the phenomenon as a whole. Such is what is meant by the efficient cause.⁴

Each cause is specific for the level of effect it sets into motion. Methyl isocyanate is the efficient cause of the bodily devastation which ensues upon its inhalation, just as Union Carbide was of the factory at Bhopal. But what drives Carbide? And what of the incident of December 1984 and its social sequelae? What caused that, and how does this relate to the question of an “efficient cause”? Here is where conflicting views of reality enter most forcefully, because so much is at stake. Carbide has not denied that Bhopal is the site of its factory or that MIC is its product – in fact it is quite proud of the fact and the role it has played in the so-called “Green Revolution,” which has augmented food production in nations of the South. As the company laid out in its website, “Ironically, the plant at Bhopal had its origin in a

humane goal: supplying pesticides to protect Indian agricultural production,” and more generally, to enhance the “Indianization” of industry in that country” through its “willingness to offer expertise, readiness to comply with Indian laws, and acceptance of a gradual approach to developing Indian consumer markets. Union Carbide’s investment had gained us widespread good will – or so we thought.” Insisting on the integrity of its safety standards and quality controls (“a deeply ingrained commitment ... [with] stringent internal standards dating back to the 1930s”), the company is deeply distressed by having been “recast ... as an archetypal multinational villain, exploiting India’s people and resources,” a “caricature [no doubt] designed to gain access to Union Carbide’s financial resources.” As for the tragic incident, with respect to which “from the first day, we had been moved by compassion and sympathy,” the company had done its own investigation proving that the cause of the disaster “was undeniably sabotage. The evidence showed that an employee at the Bhopal plant had deliberately introduced water into a methyl isocyanate storage tank. The result was the cloud of poisonous gas.” Alas, this truth has not caught on, apparently due to the Indian government’s “apparent indifference to the plight of the Bhopal victims.”

It is a coherent explanation: the disaster at Bhopal was not Union Carbide’s fault, but that of a disgruntled employee, compounded by the callousness and fecklessness of the Indian government. In this universe of meaning, configured by the ever-present specter of legal action and major financial consequences (remember the \$50 million spent by the corporation to defend itself), causality equals *blame*, to be determined legally. A similar discourse prevails throughout the ecological crisis, which tends to get reduced to a series of individual acts for which blame – and financial allocations on the basis of blame – become the relevant criteria.

The discourse of blame, or fault, or legal responsibility, is essential when it comes to parceling out a degree of justice and restitution for victims. Nor, in this instance, is it difficult to

ascertain, given the fact that patient investigation has disclosed a mountain of evidence relevant to understanding the fatal night. Let me summarize, to indicate the particular dissection of this one horrific eco-disaster, and to point a way toward a wider understanding.

- Carbide never named the saboteur, nor submitted its claims to a court of law under judicial rules of evidence. It rather deduced his agency from an analysis of the structure of its plant and let the matter rest at that.⁵
 - The company failed to notify the authorities of the large amounts of MIC stored at the plant. More, they had designed the plant in a way that made accidents more or less inevitable, as by using carbon steel valves that corroded when exposed to acid.
 - Prior to 1978, Carbide produced its pesticide, Sevin, without directly using MIC. It switched to the use of the deadly intermediate in order to produce more cheaply, and began manufacturing it in Bhopal in 1980. In fact, the German corporation Bayer made Sevin without MIC, in a safer but more expensive way.
 - Local authorities urged the plant to be built in another part of Bhopal, in an industrial zone out of range of the population. Carbide refused, saying this was too expensive.
 - The plant was losing money, because the demand for pesticides was down, and hence chronically overproduced MIC, which Carbide couldn't unload.
 - This led to an effort to cut costs, beginning in 1982. To quote Kurzman, "such cuts ... meant less stringent quality control and thus looser safety rules. A pipe leaked? Don't replace it, employees said they were told. Just patch it up. MIC workers needed more training? They could do with less (including using instruction manuals in English, which few could read). Promotions were halted, seriously affecting employee morale and driving some of the most skilled to seek work elsewhere."⁶
- By late 1984, only six operators, rather than the original twelve,

were working with MIC. The numbers of supervisory personnel also had been halved; while there was no maintenance supervisor on the night shift. Thus, indicator readings were checked every two hours rather than hourly, as required.

- In late 1981, inhalation accidents began appearing at the plant. Experts from the US appeared and warned of a "runaway reaction" inside an MIC storage tank. This followed other warnings from 1979 and 1980. Warnings from the Indian authorities went unheeded. In October 1982, a leak of MIC caused five workers to be hospitalized.
- The local authorities had no instruments to monitor air pollution near the plant.
- When the workers at the plant, through their union, protested the safety hazards, they were ignored. One worker who went on a fifteen-day hunger strike was fired.
- Although workers originally wore safety equipment, the growing slackness caused this to be jettisoned. More than 70 percent of workers were docked pay for refusing to deviate from the prescribed safety routines. All the while, pressure to keep making MIC as swiftly and cheaply as possible was sustained.
- The night of the accident, a leaking carbon-steel valve was discovered, which allowed water to slip into the MIC tanks. This was not repaired, as it would have taken too much time; in other words, would have been expensive.
- In addition, the alarm on the tank had not worked for four years, and there was only one manual backup system instead of the four-stage system used in the US. The flare tower that burned escaping gas had been out of service for more than five months, as was the vent gas scrubber. The refrigeration system installed to inhibit the volatilization of MIC was also idle, to save power costs. Nor was the steam boiler designed to help clean the pipes in active operation, for the same reason. Virtually every relevant safety instrument, from shutdown devices, to monitoring tools, to temperature gauges, was either in short supply, or malfunctioning, or designed improperly.

The maintenance temperature of the MIC was kept at 20°C, though the manual called for a temperature of 4.5° (this lower figure, needless to say, being much cooler than the average temperature of Bhopal, hence more expensive to maintain). In addition, "Carbide's Bhopal plant was designed in such a way that, after the deadly gas leak began, the main safety system – water sprays intended to 'knock down' such a leak – could not spray water high enough to reach the escaping stream of gas. In sum, the plant's safety systems had been designed negligently. Internal documents show that the company knew this prior to the disaster, but did nothing about it."⁷

- Finally, the tank that exploded had been malfunctioning for a week. Instead of dealing with it, the plant authorities used other tanks, and let this one sit, and, in effect, stew. One outcome of "stewing," as any cook knows, is the build-up of pressure and temperature, both of which can trigger further reactions in suitable substances.

So there is no question as to who was to *blame* for the horror at Bhopal. Despite the crocodile tears and bleating protestations, Union Carbide stands revealed as precisely the "archetypal multinational villain" it tries to deny being. Indeed, the only question remaining at this level is why the firm was not held fully accountable for its criminal negligence. However, the issue of blame, while necessary, is by no means sufficient to grasp the meaning of Bhopal, nor does it clear up the question of causation.

MIC can be held to be the efficient cause of bodily harm, as its molecular bonds provide the destabilizing force to tear up the delicate balance of a living ecosystem. Just so is Carbide the efficient cause of the building of the factory at Bhopal. However, when it comes down to this incident, we see that Carbide is itself subjected to other forces, and that the notion of efficient causation requires that these forces be given their due. There is no mystery here: at virtually every point listed above we find that Carbide did this or that to *lower its costs*; further, that the "this and that" had the effect of summing the risks that the monstrously

dangerous MIC (itself chosen as a product in order to lower costs) would escape; and that, further, Carbide's blameworthiness consisted precisely in the callous and self-serving way it was prepared to put Bhopal in harm's way in order to lower costs. Its evasion of legal responsibility needs to be understood within the universe of meanings that cluster about this prime necessity, from particular legal and public relations maneuvers to the whole international actup that makes an ancient and proud country like India so unable to stand up for the rights of its own people.

The efficient cause here, then, would have to comprise not just the particular greed of this corporation, but the system imposing upon it the never-ending pressure to cut costs – or, from the other side – to *make profits*. Carbide says it was in India to make pesticides. But it makes pesticides in order to make money. Being a quintessential capitalist corporation of the modern type, Union Carbide has to make money – and has to keep making it faster and faster – in order to survive in the world configured by its master, capital.

An "accident" is merely the statistically unpredictable end of a chain of circumstances. Therefore, accidents are continuous with a range of less spectacular but equivalently disruptive destabilizations. Where a sufficient number of "cost-cuttings-in-the-name-of-profit" occur, there is an accident waiting to happen. At times, this may be facilitated or triggered by human error – possibly itself a product of the same complex (an under-trained, demoralized, alienated staff, for example). However, the "human factor" fades as an independent cause to the extent people are shaped and distorted by the profit complex. If we take Carbide's own explanation to be true for present purposes, as phony as it actually is: suppose it was more than mere error that destroyed the plant, but a saboteur who maliciously set the gas loose that night. What shaped him, then? Was it inscrutable evil or the product of a chain of determinants within the force field of profit-seeking? Was he one of the workers who had been "disciplined" for refusing to cut corners, or fired for going on strike, or was he simply brutalized by a concatenation of causal factors descending upon him from

a hellish human ecology? Was he psychotic – and if so, was this some kind of genetic programming, or did it, too, descend from the mass of alienations that comprised his life world, alienations in whose composition the dominant social system will be found to occupy a place at the end of every line?

It is not that other factors are missing from the network of causal processes that summate to cause an accident, or, beyond that, the ecological crisis itself. To the contrary, they must be present, inasmuch as complex events are overdetermined. But they are present as scattered individualities, while through and around them, a great force field shapes and combines them into the effective events that move the world. The more globally and in terms of the whole we regard these things, the less we think in terms of individual blame or look for the “accidents” that disrupt what is otherwise to be construed as a rational process. Now we inquire whether the process is rational in the first place; and whether or not in this light, “accidents are waiting to happen.” We also come to ask the larger question of whether the *normal* and non-accidental functioning of the system is in itself ecodestructive – in which case it is the system that continually generates insults to ecologies of one kind or another and has to be transformed. An attention limited to the particular contours of the individual event loses track of that larger pattern, of the merits of pesticides themselves, and more generally, the “Green Revolution” of which they comprise an essential part,⁸ along with the never-ending ordeal to which the nations of the South, like India, are subjected in the world system.

Then there was the payoff. On the very day that the Indian government backed away and agreed not to prosecute Carbide any further, as if by a miracle the company's stock went up by \$2 a share on the New York stock exchange. This seemingly small figure takes its significance from the fact that the settlement of \$470 million cost Carbide's shareholders only \$0.43 a share. Therefore those who held Carbide stocks were, so to speak, richer by \$1.57 a share after the company “suffered” the consequences of causing a nightmare to descend upon the people of Bhopal.

But why did the price of Carbide stock go up? The answer is brutally revealing: because the company proved – in this first large-scale industrial accident case affecting a transnational corporation operating in the so-called Third World, or South – that it *could get away with murder*, now and in the future. Wall Street knew then that business could go forward, and that the orderly extraction of profits from the South had become more secure.

Wall Street (to be more exact, “finance capital”) is the command and control center of the system. The little numbers that flicker by on its tapes are common reductions of the potential for capital expansion as deployed over the manifold energetic points of the dominant order. In this way, the individual factories and the managerial decisions affecting them are made in the light of a larger and more comprehensive entity, a gigantic force field that polarizes every event within its range of influence, even as it continually seeks to expand that range. This is how the rules of the game are played out. It also follows that the individual motives of Carbide's executives are meaningless except as public relations material. Ward Morehouse has written in regard to this event: “Had [Carbide's management] been genuinely forthcoming and made truly disinterested offers of help on a scale appropriate to the magnitude of the disaster, they would almost certainly have been confronted with suits by shareholders seeking to hold the management accountable for mishandling company funds.”⁹

Thus, it was capital that constrained Carbide. But there is another side, which makes this an “if pigs had wings they would fly” type of argument. People who are genuinely forthcoming and disinterestedly helpful do not become managers of large capitalist firms. The tender-hearted are pushed off the ladder on which one ascends to such positions of power. For capital shapes as well as selects the kinds of people who create these events.

The story of Bhopal and its corporate miscreant continues. Carbide got out of the pesticide business, but on February 7, 2001, merged with the Dow Chemical company, which does make pesticides – it made Agent Orange for use during the Vietnam War. The new chemical colossus operated in 168 countries and pulled

in more than \$24 billion in revenue. The president and chief executive of Dow stated that the merger should save at least \$500 million annually, though regrettably 2,000 jobs would be lost as well. None of the men at individual fault for Bhopal has ever been brought to justice, nor, I think, will be in their lifetime.

The mystery of growth revealed

The "giant force field" is a metaphor for capital, that ubiquitous, all-powerful, and greatly misunderstood dynamo that drives our society. The established view sees capital as a rational factor of investment, a way of using money to fruitfully bring together the various features of economic activity. For Karl Marx, capital was a "werewolf" and a "vampire," ravenously consuming labor and mutilating the laborer. Both notions are true; and the second one, applied to nature as well as labor, accounts for the ecological crisis in all essential features. From the standpoint of the ecological crisis, corporations like Union Carbide are the soldiers of capital, and institutions at a higher level in the system, such as stock markets, the International Monetary Fund (IMF), the Federal Reserve Bank, and the Department of the Treasury, etc., its general staff. Once these relationships are appreciated, Bhopal is seen in clearer perspective – as an individual accident, the repetition of which might be avoided if industry is careful enough, and, more essentially, as the manifestation of anti-ecological tendencies inherent to capital, which will have their day one way or another so long as capital comes to organize social production. These latter are threefold:

1. Capital tends to degrade the conditions of its own production.
2. Capital must expand without end in order to exist.
3. Capital leads to a chaotic world-system increasingly polarized between rich and poor, which cannot adequately address the ecological crisis.

The combination makes an ever-growing ecological crisis an iron necessity so long as capital rules, no matter what measures are taken to tidy up one corner or another.

We need to examine why we talk of capital as though it has a life of its own, which rapidly surpasses its rational function and consumes ecosystems in order to grow cancerously. Capital is not in itself a living organism, needless to say. It is, rather, a kind of relationship like that set up by a cancer-causing virus that invades living human beings, forces them to violate ecological integrity, sets up self-replicating structures, and polarizes the giant force field. It is humanity living as capital, people who become capital's *personifications*, that destroys ecosystems.

The Faustian bargain that gave rise to this way of being arose through the discovery that fabulous wealth could be achieved by making money first of all, and things through the making of money. Everyone knows that capitalist production is for profit and not use – and if they don't know this at first, they can learn it right away from watching Wall Street discipline corporations that fail to measure up to standards of profitability. Capitalists celebrate the restless dynamism that these standards enforce, with its drive for innovation, efficiency and new markets. They fail to recognize – because a kind of failure of recognition is built into their being – that what looks like resourcefulness and resilience from one side becomes on the other an addiction and a treadmill to oblivion.

Commodities appeared at the dawn of economic activity, and commodity production became generalized with the advent of capital. The germ of capital is inserted into each commodity, and can only be released through consumption, and, with this, the conversion of what is desirable into money. To employ a formalism employed by Marx, which we shall find helpful to express our ideas as we proceed, every commodity is a conjunction of a "use-value" and an "exchange-value."¹⁰ Use-value signifies the commodity's place in the ever-developing manifold of human needs and wants; while exchange-value represents its "commodity-being," that is, its generalized equivalence, an abstraction that can be expressed only in quantitative terms and as money. Broadly speaking, capital represents that regime in which exchange-value predominates over use-value in the

production of commodities – and the problem with capital is that, once installed, the process becomes self-perpetuating and expanding.

If production be for profit, that is, for the expansion of the money-value invested in it, then prices must be kept as high as possible and costs as low as possible. As prices will tend to be held down by the competition endemic to the system, in practice, cutting costs becomes a paramount concern of capitalists. But costs of what? Clearly, of what enters into the production of commodities. Much of this can be expressed in terms of other commodities, for example, fuel, machinery, building materials, etc., and, crucially, the labor-power sold by workers for wages, which is the heart of the capitalist system. However, if the same analysis is done upon the latter, at some point we arrive at entities that are not produced as commodities, yet are treated as such in the great market that defines capitalism. These are the abovementioned “conditions of production,” and they include publicly produced facilities, i.e. *infrastructure*, the *workers* themselves, and, last but certainly not least, *nature* – even if this nature already contains, as it almost always does, the hand of prior human activity.

The process is a manifestation of the ascendancy of exchange-value over use-value, and entails a twofold degradation. In the first place, we have the commodification of nature, which includes human beings, and their bodies. However, nature, as we shall examine further in Part II, simply does not work this way. No matter what capital’s ideologues say, the actual laws of nature never include monetization; they exist, rather, in the context of ecosystems whose internal relations are violated by conversion to the money-form. The essential argument for environmental economics within the capitalist system is that by privatizing nature people learn to care for it as their property. However, the problem is that, being made property, nature is *a priori* severed from its ecosystemic ways of being. Thus the ceaseless rendering into commodities, with its monetization and exchange, breaks down the specificity and intricacy of ecosystems. To this is added the

devaluation, or basic lack of caring, which attends what is left over and unprofitable. Here arise the so-called “externalities” that become the repositories of pollution. To the extent the capital relation, with its unrelenting competitive drive to realize profit, prevails, it is a certainty that the conditions of production at some point or other will be degraded, which is to say, natural ecosystems will be destabilized and broken apart. As James O’Connor has demonstrated in his pioneering studies of this phenomenon, this degradation will have a contradictory effect on profitability itself (the “Second Contradiction of Capital”), either directly, as by so fouling the natural ground of production that it breaks down, or indirectly, in the case that regulatory measures, being forced to pay for the healthcare of workers, etc, re-internalizes the costs that had been expelled into the environment.¹¹ In a case like Bhopal, numerous insults of this kind interacted and became the matrix of a ghastly “accident.” For Bhopal, degradation was concentrated in one setting; while the ecological crisis as a whole may be regarded as its occurrence in a less concentrated but vastly more extended field, so that the disaster is now played out more slowly and on a planetary scale.

It will surely be rejoined to this that a great many countervailing techniques are continually introduced to blunt or even profit from the degradation of conditions of production, for example, pollution control devices, commodification of pollutants, etc. To some degree these are bound to be effective. Indeed, if the overall system were in equilibrium, then the effects of the Second Contradiction could be contained, and we would not be able to extrapolate from it to the ecological crisis. But this brings us to the second great problem with capital, namely, that equilibrium and confinement of any sort is anathema to it.

Accumulation

In this respect, Marx wrote in his *Grundrisse*:

However, as representative of the general form of wealth – money capital is the endless and limitless drive to go beyond its limiting barrier. Every boundary is and has to be a barrier for it. Else it

would cease to be capital – money as self-reproductive. If ever it perceived a certain boundary not as a barrier, but became comfortable within it as a boundary, it would have declined from exchange value to use value, from the general form of wealth to the specific, substantial mode of the same. Capital as such creates a specific surplus value because it cannot create an infinite one all at once; but it is the constant movement to create more of the same. The quantitative boundary of the surplus value appears to it as a mere natural barrier, as a necessity which it constantly tries to violate and beyond which it constantly seeks to go.¹²

The depth of Marx's insight should be appreciated: capital is quantitative in its core, and imposes the regime of quantity upon the world: this is a "necessity" for capital. But capital is equivalently *intolerant* of necessity; it constantly seeks to go beyond the limits that it itself has imposed, and so can neither rest nor find equilibrium: it is irremediably self-contradictory. Every quantitative increase becomes a new boundary, which is immediately transformed into a new barrier. The boundary/barrier ensemble then becomes the site of new value and the potential for new capital formation, which then becomes another boundary/barrier, and so forth and on into infinity – at least in the logical schemata of capital. Small wonder that the society formed on the basis of producing for the sake of capital before all else is restlessly dynamic, that it introduces new forms of wealth, and continually makes the past forms obsolete, that it is obsessed with change and acquisition – and that it is a disaster for ecologies.

Since each boundary/barrier is a site for commodity formation, this becomes the prescription for the "generalized commodity production" that is one of capital's hallmarks. Needless to say, the process does not occur neatly, as though capitalists sat around and selected their spots for new commodities. To some degree, of course, they do – imagine network executives trying to develop new sitcoms, or the auto manufacturers a new line of SUVs. But the more interesting examples are those where the unplanned and more or less spontaneous actions of the system

create novel conjunctures, which are then seized upon as new places for profitable activity. The prospect dear to capitalists, of making businesses out of trading pollution credits, or the pharmaceutical industry's search for new antibiotics to meet the new diseases set forward by ecological destabilization itself, are examples of this kind. The constant creation of anxieties and needs by the restless movement of the system is constantly funnelled into the circuits of new commodity activity. Does capitalism create an isolated, anxiety-ridden self whose survival requires being placed upon a market? Well, then, capital will also step in to create commodities to service this tensely narcissistic state of being – articles of fashion and image, with technologies to service these and a cultural apparatus to go along – in the case of fashion, say, a whole range of magazines, cosmetics, sexual aids, photographic studios, advertising agencies, public relations firms, psychotherapies, and so on.

Capital's regime of profitability is one of permanent instability and restlessness. Even in the ruling class, no one "rules" without perpetually proving himself, and the CEO who does not increase the rate of profit will be swiftly tossed aside. Nor can anyone rest content with the given, but must constantly try to expand it. Growth is simply equated with survival as a capitalist, for anyone who fails to grow will simply disappear, his assets acquired by another. No matter how much one has, one never really has anything; everything must be proved to exist anew the next day. Hence that well-known trait of the bourgeoisie: no matter how rich they become, they always need to become richer: notice the behavior of Wal-Mart or Microsoft. All of the fabulous "growth" of the last decades has not by one iota reduced the drive to accumulate still more, nor can it ever so long as capital reigns. The sense of having and possessing dominates all others precisely because its reality can never be secured. Strictly speaking, individuals can step off this wheel – make their fortune and retire to raise polo ponies or cabbages, or become an environmental guru. But they cease thereby being personifications of capital; and others immediately step forward to take their role.

Money – the form of capitalist value – abstracts and dissolves all relationships, replacing them with the cash nexus. This sets going the ruthless competitiveness inherent to capital, since if money is the only true bond, then there are no true bonds at all, and universal envy, suspicion, and mistrust reign. The “system works,” for the competition so induced becomes the motor forcing eternal growth as the price of survival. And because money can effortlessly expand even as its material substrate is bound by the laws of nature, the great pools of capital emerging from the ceaseless transactions provide the benchmark of growth, and, as they gather, press yet further for expansion. The pressure of capitalist growth is therefore *exponential*, that is, it becomes proportional to the total magnitude of the accumulated capital pressing for discharge. As Marx put it in another passage from the same work:

The barrier appears as an accident which has to be conquered.

This is apparent on even the most superficial inspection. If capital increases from 100 to 1,000, then 1,000 is now the point of departure, from which the increase has to begin; the tenfold multiplication; profit and interest themselves become capital in turn. *What appeared as surplus value now appears as simple presupposition, etc., as included in its simple composition.*¹³

If we unpack this highly compressed passage (the *Grundrisse* was written as a notebook for Marx's own study, and not for an outside reader), Marx is saying that in the regime of capital any original profit is only a starting point. If the same process is carried forward through a second cycle, the same expansionary force will be observed, operating, however, from the higher level. If 10 of some monetary unit goes to 100 the first time around, there will be a tendency for it to go to 1,000 the second time around. Therefore capitalist production is not only expansionary (since money has to be thrown into circulation for it to become capital, and a surplus value needs to be gained), but exponentially so. As Marx commented in *Capital*:

The repetition or renewal of the act of selling in order to buy (i.e., C-M-C')¹⁴ finds its measure and its goal ... in a final purpose which lies outside it, namely consumption, the satisfaction of definite needs. But in buying in order to sell (i.e. M-C-M'), on the contrary, the end and the beginning are the same, money or exchange-value, and this very fact makes the movement an endless one.

For more money is just money with a larger number written upon it, and so:

At the end of the movement, money emerges once again as the starting point. Therefore the final result of each separate cycle, in which a purchase and consequent sale are completed, forms of itself the starting point for a new cycle. The simple circulation of commodities – selling in order to buy – is a means to a goal which lies outside circulation, namely the appropriation of use-values, the satisfaction of needs. As against this, the circulation of money as capital is an end in itself, for the valorization of value only takes place within this constantly renewed movement. The movement of capital is therefore limitless.¹⁵

Capital's disregard for boundaries except as barriers to be surpassed arises from this fundamental property. Every boundary in the real world is useless to capital unless it can be monetized and placed into an M-C-M' circuit, at the end of which another circuit must begin. Any delay or retardation in the flow is registered as a mortal threat. If a boundary, or a feedback process, or an ecological warning signal, is produced by one investment cycle, this becomes the starting point for another. It is even a bit misleading to talk of boundaries as merely barriers. That they are, inasmuch as capital needs to keep in motion and so must refuse all boundedness. But the barrier-boundary is also the point of investment, commodification and exchange. Therefore capital needs and seeks barrier-boundaries as sites of growth. It is like the oyster's building of a pearl about a grain of sand, but where the life-activity of mollusks and other creatures who

live in ecosystems is defined by exquisite internal regulation, capital's growing is like a reckless addiction, which tends to possess individuals in direct proportion to their position in the capitalist command structure. Of course, a degree of prudent calculation is *de rigueur* as well (see next chapter). But this is not internal to the process of accumulation; it is rather applied from without, as a way of enabling the passion. Thus all reforms are installed to permit growth to proceed unchecked.

In case anyone should doubt this enthrallment, consider the following, drawn from the early part of 1997, a moment of heady expansion for the world-system. This news was greeted as though a sign of the Second Coming. In a major article in the *Wall Street Journal* of March 13, 1997, the author, G. Pascal Zachary, sampled the opinion of experts from the highest levels of the economic system, and found them unanimous in declaring permanent victory for capital on a global scale (the only exception was the doubting George Soros, who thought the boom only "may last a century"). "The positive side is spectacular," said Harvard economist Jeffrey Sachs; while Domingo Cavallo, architect of Argentina's neoliberal restructuring (soon to collapse and nearly destroy its economy) added, "We've entered a golden age." The phrase, "golden age," also expressed the sentiments of the new UN General Secretary Kofi Annan,¹⁶ while Joseph Stiglitz, at the time the World Bank's chief economist – though soon to resign, and widely considered these days a voice of reason among economists – added that with a "reproducible" world growth rate of 4 percent predicted over the next twenty years, "economic growth will reach historic levels that will, in turn, open up a new frontier for industrialized countries."

In the same newspaper of April 28, Renato Ruggiero, then director of the World Trade Organization, gave his perspective to the good news. World trade is what has brought us this blessing, increasing by a factor of fifteen in the last four decades (and up to twenty at this writing, a decade later). Simple algebra gives a clearer notion of the wonder of 4 percent growth over two decades, by translating it into a *doubling* of the production of

goods and services. Around 2020, then, roughly two of everything produced in 2000 will be produced: twice as many cars, twice as many jet planes, twice as much insecticide, twice as much material wealth in China and India. All this, according to the WTO leader, because of trade (the "open economies" grew annually by an average of 4.5 percent between 1970 and 1980; the "closed" ones, only by 0.7 percent – and now there are scarcely any closed economies remaining), and open markets for capital; and it makes the US multinational corporations "almost giddy." Boeing, for example, looked forward to \$1.1 trillion being spent to double the size of the jet fleet in the next twenty years, three-quarters of this coming from abroad. Four times as many escalators were being built in China as in the US; meanwhile the world was experiencing such an expansion of consumerism that, to take but one example, Citicorp, starting from scratch in 1990, had 7 million credit card holders in Asia and 2 million in Latin America by 1997. "The potential exists for positive surprises that would drive growth even faster, such as massive sales of government assets. 'On privatization, we've just scratched the surface,' said Shaikat Aziz, Citicorp's chief planning officer."

Recall: in 1970, only three decades in the span of time, but an eternity so far as capital is concerned, the notion of "limits to growth" seized the world elites, or at least the significant fraction of them who put forth the report of the same name under the authorship of the "Club of Rome." In little more than a generation, then, the notion of containing "growth," which is to say, retarding in capital, had been effectively driven from the collective mind of the ruling class.

Fatal carbon trading

With respect to global warming, arguably the supreme instance of the ecological crisis, we now find a gathering realization of just how deadly the prospects are, and correspondingly, a flurry of concern from ruling quarters. But the chaotic world-system keeps the response lagging far behind the pace of events, while the system-logic of capital makes even those proposals that see