

Smallholder Farmers, the CBD and the Biosafety Protocol¹

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1. Introduction

It is a great honour for both my wife and myself to have been invited to participate in this conference. It is reassuring to me that we are celebrating 100 years of friendship between Germany and Ethiopia. In the 100 years, both Germany and Ethiopia have experienced horrendous violence that showed how unfriendly each country has been to itself. A country that is unfriendly to itself cannot be friendly to another. But each country is healed so much that we are celebrating friendship. We are celebrating this friendship in a background of a worsening self-inflicted global brutality in the shape of state and organized group terrorism and counter-terrorism. It is difficult to say who is the terrorist and who the counter-terrorist. And it cannot be otherwise when the world is technologically systematically more united into a single whole than ever before, but also systematically divided into the poor and the rich—the weak and the powerful—than ever before. Our present day celebration of lasting friendship across this divide is a reassuring foretaste of the inevitable disappearance of this divide into a harmonious union of all of humanity, a union that makes us fit the technological union we have created. Why do I feel so optimistic? Because the technological union, though initially exacerbating the divide, is making all parts of the world interlinked and thus indivisible. There are pains—yes. And there will be more pains—yes. But they are the birth pains of our union that will eliminate pains for good. Of course, I also know that birth pains can kill. Will terrorism kill us off? I do not think so. I have lived long enough to see the head of the emerging baby of humanity to be reassured of a smiling mother earth, holding all of us of all nations and generations and all other species, a mother earth at peace with itself.

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It may thus sound like antithetical to look at the specifics of disharmony among humans and with Nature, taking Ethiopia as a case in point. But I believe that such a realistic look of the present will hasten the inevitable delivery of the harmonious future.

2. The Ethiopian Environment

Ethiopia has more than half of Africa's land mass above 1700 meters in altitude, and this consists nearly half of its land area. This means that nearly half of Ethiopia's land is mountainous, cut up by deep gorges, of diverse environmental conditions, and easily erodable. Even much of the lower land is equally uneven and thus also erodable.

To make matters worse, about 90% of the population lives in the mountainous areas above this 1700 m. altitude.

Ethiopia receives much rain; more than 85% of the water of the whole Nile River goes out of Ethiopia. The land generally slopes westwards. Rains come from the south-west. In the mountainous highlands, therefore, the higher eastern areas are the drier parts. This means that water flows from drier to wetter landscape making irrigation the less necessary where water is the more abundant.

These wetter and lower western parts of the highlands have malaria and animal sleeping sickness. These factors contribute to keeping the human density low. Therefore, human population is the highest where the highlands are the driest.

Ethiopia's most serious environmental problem are, therefore, land degradation coupled with frequent droughts inspite of expansive and under-populated wet areas.

It is the impact of the about 85% small-holder farmers and pastoralists that accounts for most of the land degradation. For this reason, impact assessment systems and laws used elsewhere in protecting the environment are of no value in combatting this problem. The solution is being sought in strengthening local community organization so that the community itself regulates the impact of its own members. My wife will

say more on this tomorrow. I only want to point out now that this situation forces any status quo in Ethiopia to nurture participation, or eliminate itself. Both the previous military regime, and the imperial regime that preceded it, nurtured tyranny instead of participation, and thus did not last. The present government is devolving power to the local community level. That nurtures participation and my optimism.

Though to a more limited extent, large enterprises, e.g. road construction projects, commercial farms, hydro-electric projects, also cause land degradation. There are now laws on environmental impact assessment and on environmental auditing to contain their negative impacts. Implementing them should be easy; we have experience from other countries, including Germany, to help us.

The second major environmental problem is urban pollution, primarily from organic household wastes, and the consequent spread of communicable diseases. A combination of laws to govern the impacts of municipalities and awareness raising and urban community local organization are being used to counter this problem. An encouraging development is the use of organic urban waste as a resource to make compost as soil fertilizer. There will be no better way of making dirt scarce than turning it into an income-fetching resource.

The third but fastest growing problem is chemical pollution from industry and from vehicles. This can be, and is being, curbed by a combination of the law on environmental impact assessment and environmental auditing and a law on pollution control.

3. Ethiopians in their environment

More than 80% of Ethiopians are rural. Of these, about 90% are smallholder mixed farmers and about 10% are pastoralists, mostly transhumant. Virtually all the food the 70 million people eat is produce by the smallholder farmers. The small number of commercial farms produce cash crops, e.g. sugar and cotton.

Agriculture in Ethiopia is very old. This fact, combined with the big diversity in environmental conditions, has made Ethiopia one of the 12 major centres of crop domestication and genetic diversity. Because its agriculture is still run by smallholder farmers, it is probably now the Vavilov centre with the largest crop genetic diversity under cultivation.

Even though we are celebrating 100 years of Ethio-German diplomatic relations, it was really only a little more than 60 years ago, just before the 2nd World War when Fascist Italy occupied most of the country for 5 years, that Ethiopia came face to face with the outside world. And we know that the outside world was shaped by Europe. Much of the genetic resource wealth of Ethiopia thus went into enriching the industrialized world with the Ethiopians getting virtually nothing in return. The Convention on Biological Diversity, which was signed in Rio in 1992, is the first international law that has tried to start the process of redressing this injustice. Its Articles 1 and 15 recognize genetic resources as national, and the granting of access to genetic resources as a sovereign right of the state. These articles also recognize the right of states to the fair and equitable share of the benefits that arise from the genetic resources to which they have granted access. Article 8(j) recognizes the rights of indigenous and local communities to a share of these benefits and also the right to the ownership and control of the knowledge they have accumulated on the sustainable use of biodiversity.

Enforcing these articles internationally has become an uphill struggle. The industrialized countries are happy to continue getting access to the genetic resources and community knowledge. But they do not want to share benefits. It seems that they feel that they made a mistake in agreeing to these articles of the CBD in 1992, and that now they want to ensure that they are not implemented. Did they make a mistake? Are the claims by us, the people of the global South, to these rights unjustified? I now want to examine my basis for condemning their view.

4. The Evolution of Innovations, the Local Community, and Gender Inequality

The earliest remains of technological achievements, stone tools, are found in the areas of human origin in the Rift Valley of Eastern Africa. With increasing distance polewards and upwards from this area, technological remains become increasingly more recent and incremental technological additions more and more complex¹. This is supported by the dating of the oldest stone tools by, among others, Clark², Clark and Kurashina³, and Kraybill⁴. The empirical data are consistent with the biogeographical fact that species move into new areas provided that those areas are suitable for their growth and reproduction and provided that their progeny can physically disperse into them⁵. More than any other species, humans drastically change new areas into which they move to make them like the areas in which they evolved and thus suitable for their physiology, i.e., they make the new areas they go into like those of the Rift Valley in Eastern Africa to the extent that their physiology requires.

In the Rift Valley of Eastern Africa, humans co-evolved with their predators, preys, food plants, disease causing organisms and competitors. The path of evolution that gave them a competitive advantage, that of modifying their environment, enabled them to selectively favour the plants and animals that were useful to them, producing agriculture. Their effort to modify their environment to be at the temperature they evolved in gave rise to the construction of shelters and the making of clothing through tanning leather, weaving, etc., and thence to other industries. This meant that the technological frontier kept moving further and further polewards¹.

While the early humans were living with their predators and competitors, which were effective as they had co-evolved with them, survival depended on group action as the human individual is physically neither as strong as the lion nor as fast as the gazelle. Human evolution was thus correlated with a strong community organization which subsumed the individual to defeat the lion and to surround the gazelle. This meant that, since the individual continually interacted with others except when asleep, community considerations were always paramount. This is not to imply that

individual needs could remain unmet, but that the room for antisocial traits in the individual was very limited, and, conversely, that the community had to be sensitive to individual needs.

When the economic system was hunting and/or gathering, humans bands were mobile, having to always find new ground with new food, as they now are in hunter/gatherer societies in parts of all the continents. The mobile unit of society (subclan or clan) was then the basic unit of organization, with the individual finding her/his role and share of power and benefits through the group. Genealogically related sub-clans and/or clans then constituted higher, and increasingly less clearly defined, levels of organization. An appreciation of this can be obtained by reading the history of the ancient Israelites in the Old Testament.

Crop cultivation, and to a lesser extent also fishing, fixed the family to a specified spot. The interactions of the individual with society then came to be determined more and more by geography rather than by genealogy. Initially kinship lines and geographical positions were presumably very strongly correlated. But with intermarriages outside lineage affinities at the edges and with population movement, the correlation became reduced with time. In accommodating the new geographically determined interactions outside the clan or tribe, a higher unit of organization incorporating both geographical and genealogical systems had to be found. Therefore, culture, delimited by geographical extent, replaced genealogical relationship except at the family (extended or nuclear) level. It may sound ironical, therefore, that by tying down the individual to a spot, crop cultivation bred a higher level of universalism than hunting and/or gathering with their wider (more universal) space for the individual to move in and encounter diversity.

Pastoralism unrelated to crop production tends to be transhumant and is, in its geographical context, of the same effect on social organization as hunting and/or gathering. Therefore, transhumant pastoralists retain organizational hierarchies based on lineage. The tragedy with Somalia and, perhaps to a lesser extent with Afghanistan, can probably be explained by the reduced level of universality dictated

by clan/tribal allegiances fostered by the prevalent transhumant economic system. It is perhaps equally revealing to note that the long civil war in neighboring Ethiopia, which is primarily a country of peasants (farmers), remained that of competitors for power, and it stopped in 1991 as soon as one side won.

When humans moved polewards, the increasing seasonality made it essential to stay indoors even during the day for increasingly longer time each year. This can be presumed to have made the family rather than the local community more and more the functional unit of organization and the focus of life.⁶

Hunting was done primarily by men as a group. The increased dependence on hunting, which was the case polewards owing to seasonality reducing food of plant origin, would have given men an obviously prominent role in the survival of the family and an advantage over women. According to Gough⁷, for example, in 60% of hunting societies, marriage involves the woman moving into the unfamiliar band of the man while the reverse happens in 16-17% of the societies only, indicating the woman's disadvantage. In contrast, gathering, which remained the main food source equatorwards owing to the perpetual availability of food plants, was done by women. This helped them stand their ground against the physically stronger men. The advent of crop cultivation equatorwards, mostly done by women as an extension of gathering, allowed the relatively high profile of the female to continue. For example, the relatively high position of women in the crop cultivating Iroquois society is attributed by Brown⁸ to their control of the economy. In contrast, as crop cultivation moved polewards, the hitherto hunting men adopted farming and continued to play the controlling role. Both crop production and animal rearing, therefore, both increased production, and resulted in the subjugation of women by men polewards.⁹ Since men no longer got together to hunt, the pressure for the demise of the local community also increased polewards exacerbating the impact of seasonality. The state and its associated institutions then took over the functions of the local community. The local community of known individuals with whom the given individual interacted and enjoyed a sense of belonging was thus swallowed up by the impersonal chiefdom, dukedom, principality, etc.. Institutions, including places of

worship and entertainment, then began to regulate the lives initially of individual families, and gradually of single individuals and to cater for individual needs. Equatorwards, where local communities continued to cater for the individual, some development of institutions did indeed also take place, but only either as a result of local community initiative and thus subject to its norms as contrasted to state imposition, or as a response to influence and/or conquest from polewards. Such influences and conquests from progressively polewards were easy since the increase in technological capacity, the weakening of the local community and the control of the individual by the impersonal state or institution, made it progressively easier to raise and equip armies and to regiment populations. These influences and conquests were also instrumental in the demise equatorwards of matrilineal inheritance and the fall of women into second class membership in society.¹⁰

The poleward movement of humans, therefore, produced an incremental growth in science and technology, inequality between the sexes, a prominence of the family, a demise of the local community, a strengthening of state superstructures, and a regimentation of the individual.

When we consider innovations and the barriers to their transfer in our present day world, therefore, the differences in the male individual dominated and more powerful North and the local community dominated and weaker South stand out as incompatible counterparts. The former treats anything communal as a free good as indeed does the latter, but for opposing reasons and towards opposing ends. Because now the North dominates, legal norms for protecting the innovations of Northern individuals have been developed in this era of globalization, but not for protecting the innovations of their Southern functional counterparts, the indigenous and local communities. As a result, thousands of Southern collective innovations are not only used by Northern natural and legal individuals without reciprocation, but are given private IPR protection, and thus withdrawn from the common pool. Since the majority of them deal with living things, this process has been referred to as biopiracy.

5. The Elements that Should Go into a Benefit-sharing Agreement

The CBD has already defined the benefits that should accrue to an owner of genetic resources, knowledge, innovations or practices upon their use by another party. The Origination of African Unity (now the African Union) has incorporated these benefits in its “African Model Law on the Protection of the Rights of Local Communities, Farmers and Breeders, and for the Regulation of Access to Biological Resources”¹¹. I have already summarized these benefits in a paper I presented at a conference¹². They include:

- research and development to be carried out in the country giving access (Art. 4.1. of the Model Law, based on Art. 15.6 of the CBD);
- prior informed consent of both the state and the indigenous or local communities (Art. 4.2 of the Model Law, based on Art. 15.5 & 8(j) of the CBD);
- a list of other conditions to agree to before a contract is signed (Art. 4.3 of the Model Law, based on Art. 15.4 of the CBD), including commitments for the conservation of biodiversity (Art. 4.3 (a), (g) & (h) and Art. 4.9 of the Model Law, based on Art. 6.7, 8 (c), (d), (j), (k) & (l), 9(c) & (d) and 10(a) & (b) of the CBD);
- commitment to provide information and duplicate specimens to the country giving access (Art. 4.3 (b), (c) & (g) of the Model Law, based on Art. 15.7 and 17.2 of the CBD);
- commitment not to transfer genetic resources, knowledge, innovations or practices to third parties without authorization (Art. 4.3 (d) of the Model Law, based on Art. 15.5 of the CBD);
- commitment not to patent (Art. 4.3 (e) of the Model Law. This is not directly based on the CBD but on the fact that patenting living things and life processes is disallowed in the laws of most developing countries. It should, however, be noted that Art. 16.2 of CBD, though recognizing IPRs in general terms, does not specifically provide for the IPR protection of biological materials, showing that the choice of what and how to protect is left open. However, as already pointed

- out in Section 5, the issue has caused a North-South divide in the call for the revision of Article 27.3 (b) of TRIPs. It is thus best to avoid at least patents);
- payment for the community labour that has gone into creating or finding out the specific useful characteristic of the biodiversity or for the knowledge, innovation or practice being accessed and the work load borne by the state in making the access possible (Art. 4.3 (f) of the Model Law, based on the common practice of recovering expenses incurred while giving a service);
 - commitment to abide by certain procedures aimed at ensuring the implementation of the mutually agreed terms (Art. 4.4, 4.5, 4.6, 4.7, 4.8, of the Model Law, which are obvious and need no explanation, except for pointing out that in Art. 4.7, a guarantor is required because, often, the person getting access will leave the country before the benefit accrues to him and there would then be no means of ensuring that each party abides by the mutually agreed terms. This is consistent with the decision VII/19 of the 7th COP of the CBD which, as pointed out in Section 6, requires states which are parties to the CBD to enforce compliance of their citizens with their respective mutually agreed terms).

I have, in fact, published a model contract for use between the owner and user of genetic resources and/or technologies¹³. But, since legal systems vary from country to country, this present itemization of the required elements will suffice here and model agreements are best developed by, and for, each country separately.

6. Genetic Engineering, Biosafety and the North-South Divide.

Genetic engineering is a new Northern technology that strengthens the Northern view that biodiversity and knowledge that belongs to indigenous and local communities is raw material that is there for the taking.

6.1 The Appeal of Genetic Engineering

There is nothing more compelling in life than going on living. It is the imperative to go on living that motivates all our activities that keep our physiological systems going¹⁴. A living thing that is not driven by this imperative would not escape the

many physical and chemical dangers in nature that tend to degrade the living to the inanimate and the many other living things that would feed on it.¹⁵ A thing seen alive is, therefore, proof that it has optimized its physiology to maximize its own subjugation to the imperative of going on living.

But all living things die. Why they have to die and how dying can be circumvented is now an issue of intensive research¹⁶. But I do not intend to pursue this issue further now. I only want to point out that life's solution to this problem has been reproduction¹⁷. In humans and in most other species, sex is what maximizes reproduction.¹⁸ It is, therefore, hardly surprising that the imperative to reproduce is maximized in any living thing, and sex appeal is irresistible.

In humans, the interplay between these two imperatives, to survive and to reproduce, governs both personal and socio-economic life. The determinants of both imperatives are our instincts and our learned cultural norms¹⁹. Desmond Morris²⁰ described this interplay in an easily readable form nearly 40 years ago as follows: "For him [the human being] the main trouble will stem from the fact that his culturally operated advances will race ahead of any further genetic ones. His genes will lag behind, and he will be constantly reminded that, for all his environment-moulding achievements, he is still at heart a naked ape."²¹ Little did he know that "his culturally operated advances" would enable humans to invent genetic engineering. This technology now tantalizes us with the ability to mould the non-living component of our environment more effectively than ever before; to reconstitute the living component of our environment to our liking; and to recreate our species to suit our chosen destiny. Our sexuality has always modified our culture,²² and our culture has always modified our sexual behavior²³. Now, we are set to redesign our sexuality. It is becoming possible to even defeat death¹⁶, making not only the possibility, but also the necessity, of eliminating sex conceivable. Therefore, genetic engineering is a sublimation of both culture and sex. As such it has literally an irresistible subliminal sex appeal that imbues the putative potent genetic engineer with intellectual arrogance. In a person's life, the most difficult to objectively understand is one's own sexuality; the most difficult to resist is another's sex appeal; and the most difficult to manage is one's

own potency elicited by that sex appeal. Is it not inevitable, therefore, that genetic engineering is an extremely emotive and a very strong motive force of our time?

6.2 The Likely Impacts of Genetic Engineering Now and in the Near Future.

I presented a synopsis of socio-economic and environmental issues that modern biotechnology, and especially genetic engineering, raises at a workshop preceding our negotiations on the Cartagena Protocol on Biosafety in 13-17 October 1997, in Montreal. I looked at the synopsis again a few days ago. I found it to be still valid. Here it is with some updating.

- 6.2.1 Research and Development (R&D) in, and application of, modern biotechnology are associated with some risks to health and/or biodiversity and the environment.²⁴ Negative impacts may take decades, or even more, to be noticed.
- 6.2.2 Socio-economic impacts are, on the whole, long term, and our predictions on the likely impacts of the young modern biotechnology necessarily lack empirical data. Some impacts, however, can be felt in a few years. It has, for example, been reported that the introduction of GE crops into Argentina has squeezed many smaller farmers out of agriculture altogether.²⁵
- 6.2.3 R & D in, and application of, modern biotechnology and biosafety are not highly equipment intensive. Thus modern biotechnology need not be very expensive. But it requires large numbers of well trained scientists. As such, it is within easy reach of developing countries which have low capacity for capital intensive innovations.
- 6.2.4 On the other hand, developing countries have not seriously undertaken the training of biotechnologists and biosafety experts, and even less the means of their retention.
- 6.2.5 Venture capital needed for R & D in modern biotechnology and in biosafety, though not large, requires a long time before it yields returns. In developing countries, this means that only public (government) funding can be expected

to be available for it; the small private businesses are unlikely to make such long term investment.

- 6.2.6 The initial promoters of modern biotechnology in industrialized countries were public (government) institutions and small enterprises.
- 6.2.7 But in the industrialized countries, governments have been withdrawing from R & D in modern biotechnology, leaving it to the private sector. Oversight over the safe applications of biotechnology has been weakened now that governments leave biotechnology to the private sector.²⁶
- 6.2.8 The seed and chemical industries of developing countries have recently tended more and more towards being controlled by transnational corporations. To globalize this, patents and patent-like breeders' rights are being universalized through the Agreement on Trade-related Aspects of Intellectual Property Rights (TRIPs) of the World Trade Organization (WTO). Implementing TRIPs is expensive²⁷. Worse still, it means that developments in biotechnology in developing countries will also be controlled by these same corporations that have already patented the promoters, terminators, vectors, constructs and even many of the genes used in genetic engineering R & D.
- 6.2.9 Biotechnology R & D has mostly focused on producing specified commodities, especially drugs, for industry and for the health service through transgenic crops or even animals or through bioreactors which use enzymes, tissue culture or transgenic microorganisms.
- 6.2.10 Some of the transgenic plants have been given the capacity to grow outside the environmental settings of their non-transgenic counterparts. When transgenic crops are produced outside the normal latitudinal environmental ranges of the species and exports are affected, the farmers in their areas of origin in developing countries may reduce, or even stop, cultivating the crops. This would result in severe genetic erosion. Besides, with the loss of their livelihood, these farmers will have no choice but to search for alternative incomes. This usually ends up in deforestation, overfishing, overhunting, and other types of destruction of biodiversity and the environment.

- 6.2.11 Through the introduction of specific traits, any organism can be engineered to yield any biochemical products. The inevitable result would be globally scattered living factories impossible to switch off. Through enzyme technology, many products can be changed to other products. This makes plants, animals, and microorganisms in the bioreactor interchangeable as commodities. This will blur the boundary between agriculture and industry, between the farm and the factory. As interchangeability of sectors and products increases, there could be an excessive presence of some chemicals and shortage of others in the biosphere. This could usher in a new form of pollution. It could, in particular, seriously disturb the balance of microorganisms in the environment and thus the whole of the biosphere. Coupled with the increasing human population and the transformation of a substantial component of the world's biomass into human biomass, the consequences could be disastrous for all life. How should we apply the Precautionary Principle?
- 6.2.12 This blurring of differences among commodities means a possible loss of market for traditional agricultural products, especially for the developing countries.
- 6.2.13 On the other hand, it gives developing countries, which have low labour costs, an advantage in producing in their farms as commodities products which are now being made through complex chemical process in capital intensive factories in industrialized countries.
- 6.2.14 In industrialized countries, seed, chemical, and biotechnology companies have been merging or being bought up and now a given transnational corporation tends to have activities in all three sectors. In both developing and industrialized countries, transnational corporations, to the exclusion of both governments and national entrepreneurs, are getting to control whole systems starting from the laboratory and leading to the retail floor²⁸. The impact is greater on developing countries. Neither national, nor international law seems willing or able to develop antitrust capacity to break up these trans-sectoral chain monopolies.

6.2.15 Attempts at correcting human genetic defects through genetic engineering (gene therapy) are increasing. This raises many questions on ethics and the future of human evolutionary trends. Can humanity really direct its own evolution?

6.2.16 Attempts at influencing the population dynamics of wild species is taking place.²⁹ The ecological impacts, especially of transgenic long lived trees, may take centuries to show. What should be our strategies of applying the Precautionary Principle? Or, should we give up the Principle?

7 Concluding Remarks

The fall of the Soviet Union generated two opposing trends. Those that saw that fall as providing an opportunity for creating a more just world where the powerful humans help the weaker humans, and where humans help the other apparently weaker forms of life produced the CBD, including its Cartagena Protocol on Biosafety. They also produced the Framework Convention on Climate Change. This was in 1994. Those that saw that fall as a vacuum into which to extend their power produced the World Trade Organization (WTO), especially its Agreement on Trade-related, Aspects of Intellectual Property Rights (TRIPs). That was in 1994.

Now, 13 and 11 years later respectively, we find that the legal instruments that the optimists produced are blunt, without an enforcement mechanism comparable to the Dispute Settlement Understanding (DSU) of the WTO. We also find that the WTO is faltering. The North-South confrontation is so clear that 2 of its Ministerial Conferences, that of Seattle in 1999, and that of Cancun in 2003, collapsed. Its paralysed arm, therefore, merely rests on what would have been a powerful weapon to wield, the DSU.

It is the terrorists that are having an effective time. And, tantalizing genetic engineering could be adding new dimensions to their instruments of terror.

So, what has happened to my optimism? Courage—the night is darkest just before the dawn.

Endnotes

- 1) Tewolde Berhan Gebre Egziabhr, 1991. "Management of mountain environments and genetic erosion in mountain systems: the Ethiopian example", **Mountain Res. & Dev.**, 11: 225-230.
- 2) Clark, J. Desmond, 1981. **Tools and ourselves, Seventeenth Raymond Dart Lecture, delivered 4 July 1979**, Witwatersrand University: Johannesburg.
- 3) Clark, J. Desmond and H. Kurashina, 1980. "New Plio-pleistocene archaeological occurrences from the plain of Gadeb, Upper Webi Shebele Basin, Ethiopia, and a statistical comparison of the Gadeb sites with other early stone age assemblages", **Anthropology**, 18: 161-187.
- 4) Kraybill, N, 1977. "Pre-agricultural tools for the preparation of food in the Old World", in Reed, C.A. (ed), **Origins of Agriculture**, Mouton Publisher: The Hague, p. 485-521.
- 5) Good, Ronald, 1964. **The Geography of the Flowering Plants**, Longmans: London, p. 43-45.
- 6) Green, J.R., 1992, in his **A Short History of the English People**, The Folio society: London, p. 4, describes individualism in ancient England, which gave the world the present industrial culture, as follows: "As every freeman was his own judge and his own legislator, so he was his own house priest; and the common English worship lay in the sacrifice which he offered to the god of his hearth".
- 7) Gough, K., 1975, "The origins of the family", in Reiter, R. R. (ed), **Towards an Anthropology of Women**, Monthly Review Press: New York, p. 51-76.
- 8) Brown, J. K., 1975, "Iroquois women: an ethnohistoric note", in Reiter, R. R. (ed), **Op. cit.**, p. 235-251.
- 9) For example, reference can be made to: Draper, P., 1975, "!"Kung women: contrasts in sexual egalitarianism in foraging and sedentary contexts", in Reiter, R. R. (ed), **Towards an Anthropology of Women**, Monthly Review Press: New York, p. 77-109; and Sacks, K, 1975, "Engels revisited: women, the organization of production and private property", in Reiter, R. R. (ed), **Op. cit.**, p.211-234.
- 10) For example, in Africa, as pointed out by Snyder, M. C., and Mary Tadesse, 1995, **African Women and Development**, Zed Books: London, p. 20-26, women in the

pre-colonial era, as the cultivators of the land, were in charge of what happened to its produce. Sorrenson, M. P. K., 1968, in **Origin of European Settlement in Kenya**, Oxford University Press: London, p. 177-179, points out that the customary land tenure was that of usufruct for the family, with ownership being that of the lineage. Frank, A. G., 1979, **Dependent Accumulation and Underdevelopment**, Monthly Review Press: New York, p. 159, points out that, during colonialism, the land that was not taken by Europeans was recognized as belonging to chiefs. In post-colonial Africa, the system was simply adopted with African men replacing the Europeans thus giving rise to the disinheritance of women who, however, still remain the farmers.

- 11) Ekpere, J. A., 2001, **The African Model Law**, The Organization of African Unity: Addis Ababa, p. 33-71.
- 12) Tewolde Berhan Gebre Egziabher, 2003, "Taxonomic Botany and Globalization", paper presented to the 17th AETFAT Congress, 21-26 September 2003, Addis Ababa.
- 13) Tewolde Berhan Gebre Egziabher, 1996, "Biodiversity collecting: in the South, of course!", in Solomon Tilahun and Sue Edwards (ed.), **Op. cit.**, p. 1-14.
- 14) Kauffman, S. A., 1993. **The Origins of Order: Self-Organization and Selection in Evolution**, Oxford University Press: New York, N. Y., p. 407-645;
- 15) From the extensive literature on this eternal subject may be cited: Brooks, D. R., and Wiley, E. O., 1988. **Evolution as Entropy, 2nd Edition**, University of Chicago Press: Chicago, 415p, especially p. 31-175.
- 16) For example, read Cohen, p., 2004. "Starvation diet may not be the only way to reach your 120th birthday", **New Scientist**, 4 September 2004, p. 12.
- 17) Brooks and Wiley, 1988. **Op. Cit.**, p. 67-101.
- 18) Wilson, E. O., 1980. **Sociobiology, the Abridged Edition**, The Belknap Press of Harvard University Press: Cambridge, Massachusetts, p.155-167; Cronin, H., 1991. **The Ant and the Peacock**, Cambridge University Press: Cambridge, p. 113-249.
- 19) Morris, D., 1967. **The Naked Ape – A zoologist's study of the human animal**, Jonathan Cape: London, 252p.
- 20) Wilson, E.O., 1980. **Op. Cit**, p. 18-19
- 21) Morris, D., 1967. **Op. Cit**, p. 48

- 22) John Maynard Smith, in Cronin, H., 1991, **Op. Cit.**, p. ix points out that sexism has influenced even the science of biology.
- 23) Wilson, E. O., 1980. **Op. Cit.**, p.155-167 discusses both impacts of sexual behaviour on culture, and of culture on sexual behaviour. Cronin, H., 1991, **Op. Cit.**, p. 325-430, also discusses both impacts in more detail.
- 24) Even in the United States of America, where the Precautionary Principle is rejected as the basis of biosafety legislation, environmental risks are considered seriously, though not as seriously as the Cartagena Protocol on Biosafety would require as can be seen by examining the following publication: National Academy of Sciences, 2002. **Environmental Effects of Transgenic Plants**, National Academy Press: Washington D. C., 320 p. The signals we get on the health impacts of genetically engineered (GE) crops are conflicting. According to a document from the German Academies of Science and Humanities Commission Green Biotechnology (http://www.akademienunion.de/polf/memorandum_green_biotechnology.pdf) eating GE food approved in Europe or the United States is perfectly safe. According to others (e.g. Ho, M. W., 2001, "**US Food borne Illnesses up Two to Ten Fold**", **ISIS Report**, 3 Nov. 2001; and Soil Association, 2002. **Seeds of Doubt: North American Farmers' Experiences of GM Crops**, Soil Association: Bristol, (U.K.), p. 25-34, the reverse is true. M.W. Ho thinks the likely cause for the increase in foodborne illnesses in the USA compared to Sweden may be attributable to GE food. The Soil Association reports that pigs that eat Bt varieties of GE food suffer loss of fecundity. The German Commission's report says that the safety considerations include toxicity, carcinogenicity and allergenicity. Toxicity and allergenicity are detected more or less immediately. But carcinogenicity can take much longer to detect than GE food has been being consumed. Therefore, the application of the Precautionary Principle would warn us that their conclusion is premature, and Germany is party to the Cartagena Protocol on Biosafety.
- 25) Pengue, W., 2001. "The Impact of Soybean Expansion in Argentina", **Seedling, September 2001** (www.grain.org/publications/seed-01-9-3-en.cfm).

- 26) For example, Heinemann, J. A., A. D. Sparrow and T. Traavik, 2004. "Is confidence in monitoring of GE foods justified?" **Trends in Biotechnology**, v. **22(7)**, p. 331-336 conclude that the present oversight is inadequate.
- 27) The Commission on Intellectual Property Rights (CIPR), 2002, **Integrating Intellectual Property Rights and Development Policy**, CIPR: London, p. 145-146 has found that smaller developing countries fail to recover the cost of establishing intellectual property rights protection systems from charging for the services they give. Jamaica, for example, suffered a net loss of \$120,000 in 1999/2000.
- 28) Paul, H., and R. Steinbrecher, 2003. **Hungry Corporations: Transnational Biotech Companies Colonise the Food Chain**, Zed Books: London, 242 p.
- 29) **The New Scientist** of 13 January 2001 has an editorial on the quick death of rats in an experiment in which a gene that naturally occurs in all mammals, including rats, is introduced into them through recombinant DNA technology. Jackson, R. J., A. J. Ramsay, C. D. Christensen, S. Beaton, D. F. Hall and I. A. Ramshaw, 2001. "Expression of mouse interleukin-4 by a recombinant ectromelia virus suppresses cytolytic lymphocyte responses and overcomes genetic resistance to mousepox", **Journal of Virology**, vol. **75 (3)** p. 1205-1210, have given the explanation. They state that the ectromelia virus (or mousepox virus) expresses the interleukine-4, but, by doing that, it also suppresses CD8 lymphocyte formation as well as inhibiting the expression of immune memory response.