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Zoological Collections and the Effects of Scientific Territorialism

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1. Introduction

In the area of the biological sciences, it is usual that scientists store biodiversity material in scientific collections. As a means for obtaining greatest results in researches, it becomes natural to establish mutual cooperation between collections.

Unfortunately, one recurrently encounters conflict of interests among scientists, affecting the functioning of scientific collections. Although papers illustrating the human side of scientists, including their frailties, are quite popular (e.g., Hellman, 1998), cases specifically involving collections are less well known.

Researchers that study a specific group of organisms seem to create an affective bond so strong for the animals-objects studied that they often act as the owners of some samples of the collection or even of the whole taxonomic group. As a consequence, when exchange and access to material or information are needed, difficulties may be created: samples are hidden and information is not fully disclosed.

In this chapter, we explicit the behavior of scientists[1] with reference to scientific collections, their obstacles, beliefs, fears and greeds. We demonstrate that the conduct of scientists sometimes resembles a behavior present in social animals, known as territorialism[2]. Thus maybe some of the observed conducts could be justified by the soft politics of power, camouflaged in publications, that arises in the science fields.

For this purpose, we introduce Bourdieu's idea of hierarchy inside the sciences and Foucault's conceptions of power. Unhappily, we demonstrate that power conflicts are closer to us scientists than we thought or wished to be true. Therefore, this chapter intends to make a reflection over the professional conduct dynamics in scientific collections.

In behalf of our objective, it is important that the reader understand the meaning of a few biological contexts. That's why we clarify some aspects of ethology (the study of animal

[1] We realize that this behavior must not and cannot be generalized to the entire group of professionals that work with scientifc collections. However, this chapter concerns behavior pertaining to a by no means negligible portion of this group. Therefore we apologize to those professional that feel unjustly affected by this exposure.

[2] We take into consideration the diferent perspectives (sociological, geographical, political, etc.) of territory and territoriality. However, in this chapter, territorialism is quoted as a concept belonging to the biological sciences, as explained in the following topic.

behavior) and zoology (the science that deals with animals). In topic two, we explain the social behavior of animals. We emphasize their relation in and outside the group and their relation to the environment. In topic three we make clear what a scientific collection is, explaining its aims and importance. In subject four we demonstrate the dynamics between some professionals that work on those collections. And in topic five we associate this behavior with animal territorialism, which is established as a consequence of the hierarchy that is maximized by the illusion of power existing inside the scientific academy.

2. Animal social behavior: Territorialism

The objective of explaining this behavior is that we expect the reader, in later topics, to be able to imagine an entertaining picture of us biologists acting similarly to other social animals[3].

Animal behavior is one of the several attributes of animals that can only be studied in nature (Fig. 1), when the animal is still alive. The majority of ethological and ecological characters can't be preserved in scientific collections, in contrast to other sources of knowledge on biodiversity (Martins, 1994). That's why the combination of both practices is so important to unveil biological knowledge.

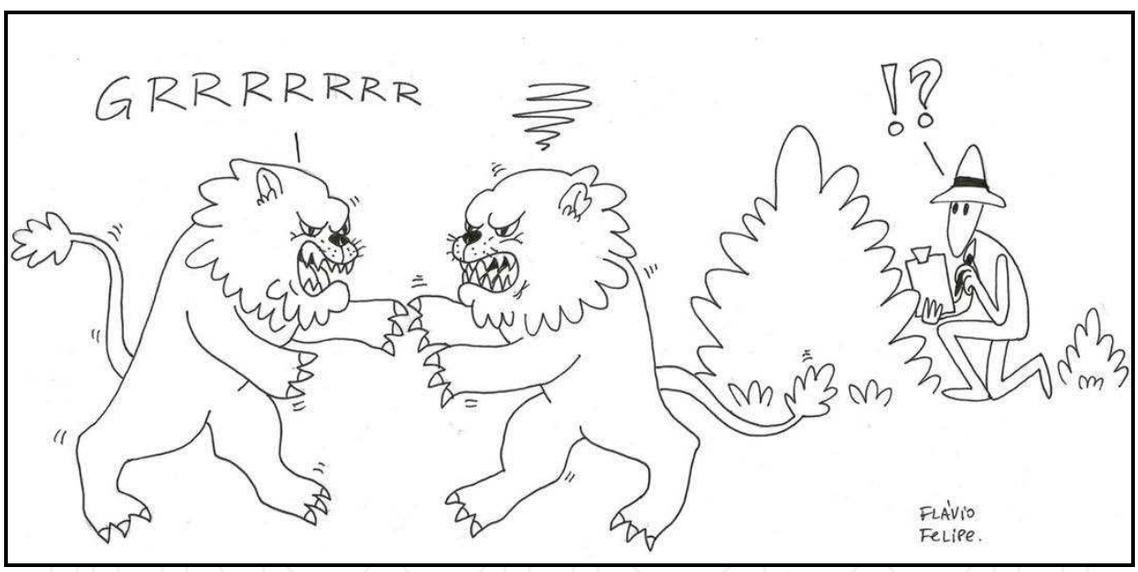

Fig. 1. Territorial conflict among animals.

Few animals manage to live completely alone. Most need, at least, to find a partner of their own species (Carthy, 1974). The interaction between individuals is not random and it is possible to find a pattern in social relationships. This pattern is called social organization (Deag, 1980).

[3] We hope to make clear that we do not intend to extrapolate animal behavior as a fixed pattern for human behavior. We realize the complexity involved in this assertion. Therefore, we tried to take all precautions to avoid falling into the deterministic fallacy of sociobiology. Our goal was to show how similar the behaviors can be in some situations.

Co-habitation and acquaintance in groups require behavior adaptations to maintain the cohesion of the group, either temporally or permanently. As a result, it is possible to observe a complex net of relationships characterizing social positions among members of the same groups (Carthy, 1974).

In some societies with hierarchical positions it is possible to see a dominant-subordinate relationship where violence becomes minimized. In some cases a stable dominant relation arises because the dominant animal is bigger and stronger than the others (Hutingford & Chellapa, 2006, as cited in Chase et al., 2002). Once this hierarchy is established, this configuration will be stable. Generally, the situation is accepted with no confusion. This implies that a hierarchical ordination decreases the mutual aggressiveness in the group. There's no doubt that this represents an advantage from the biological point of view. Combats are harmful not only because of the physical damages, but also because of the time spent in an activity that is otherwise useless for the needs of the group (Carthy, 1974).

There are a huge amount of social behaviors inside a group of animals, such as reproduction, foraging, play, and so on. The social behavior with most interest to us in this paper is territoriality. Territory defense occurs when animals adjust their struggle behavior to their position in space, defending a specific area. Such protected areas allow the attainment of food, water, rest spots, shelter, or sexual and cleaning partners. Depending on the species, these areas can be maintained for distinct periods of time, such as a few hours a day, a whole station, or a year, and it could be defended for one individual, for a couple, or for a group of animals (Hutingford & Chellapa, 2006).

In territorial systems the size of the land and the configuration of their boundaries are the result of a state of equilibrium between the behaviors of neighbors. There is a minimal limit to the size of the territory. When population density is high, the boundaries of the land may overlap, making the lands relatively smaller. In such occasions, the limits of defense and aggressive reactions between neighbors are established (Sire, 1960).

The winners obtain the best territories, while the losers stay with the worst areas or end without land. Quality land and land achievement will depend on the density of a population, defensibility of the area, availability of resources, and the age of the animal. Territorial males can expel each other with strength and still allow the presence of some subordinate (non-territorial) males on their land. Animals with lower hierarchical position have their access to resources limited by those with higher positions and therefore suffer more debilitating effects, aggression and sometimes are forced to migrate (Deag, 1980).

In some species the presence of aggressive and strong members in the society preclude that other members have access to the limiting resources. As a consequence, the excluded animals use different tactics in order to share the forbidden resources (Krebs & Davis, 1993). The animals with no land can live in a tolerable way in the areas that belong to other well succeeded animals. Alternatively, animals with no land could spend the whole or part of the time on the boundaries of the land, exploring the resources of that region without being observed (Hutingford & Chellapa, 2006).

The defense of a territory implies the existence of something that must be defended against competitors. Why would an animal try to take a resource that already is being protected, if there were plenty of undefended resources? The fact that competition occurs implies that

the resources are limited, or that there are considerable differences between their qualities (Deag, 1980).

Animals fight each other for two basic reasons: to establish a domain in a social hierarchy or to establish territory. Some species are purely hierarchical, with no territory. Others are purely territorial, with no hierarchical issues being involved. Still others keep hierarchy in their own territory and must face all kinds of aggressiveness. We, the naked apes (as Desmond Morris would say), belong to the last group: we face both problems (Morris, 1984).

3. Scientific collections

3.1 Short overview of the history of museums

The history of museums may be separated into six epochs: Greco-Roman (until 400 A.D.), Pre-Renaissance (400 A.D. – 1400), Renaissance (1400 – 1600), Pre-Linnaean (1600 – 1750), Linnaean (1750 – 1850) and Modern (1850 onwards). We will not discuss these periods, but when one looks into their history it may be realized that collections have always reflected the social atmosphere and the state of knowledge of that specific period (Whitehead, 1970).

Natural history documents were not only words, texts or archives, but bright places where things overlap: herbaria, collections, gardens (Foucault, 1966) and cabinets of curiosities (Fig. 2; Papavero et al., 1997). These cabinets of curiosities were rooms designated to store exquisite material that was collected throughout the world. The owner could also buy goods from world travelers that gathered uncommon material in expedition journeys, such as unicorn horns, plants, animals, objects, etc. (to see more on expeditions, see Papavero et al., 1995). As the museums in former periods were private collections, one common practice was to buy, sell and exchange items. This activity could be very promising, depending on the size of the collection, the materials themselves, and their degree of conservation.

One important function of museums in past centuries was to pull together several casual and disjointed collections split throughout the world. The worship of what is rare, unusual, marvelous, miraculous and sacred (R. Morris & D. Morris, 1965) make these places sets of natural and artificial objects ideal for study or, alternatively, for gaining prestige in society (Whitehead, 1970).

It is usual to affirm that the constitutions of botanical gardens and zoological collections reflected a new curiosity stimulated by the exotic plants and animals. The bizarre, mysterious and glamorous were spectacular; these facets were exposed in parties and amusement parks. Legendary reconstructions (as pictures and drawings) where presented in which the beast showed its mythical facets (Foucault, 1966; cf. Almaça, 2002).

These places were not dedicated exclusively to scientific studies. They were also places for social meetings, where the aristocrats went to discuss politics, art, economy, etc. The more rare materials present in a collection, the more valuable they became economically and socially.

Therefore, in the several facets that the museum represents throughout history, they do not only reflect the state of knowledge of zoology, but also the social atmosphere. These features could determine if a museum could only raise the prestige of their owner or if they could also add to the progress of knowledge (Whitehead, 1970).

Fig. 2. A rich "cabinet of curiosity". Adapted from Papavero et al. (1997).

As the disciplines of zoology and botany turned into sciences that required observation and experimentation, a huge proliferation of museums occurred. They were the natural history museums. During this period the museums changed from a pure catalogue of natural objects to an attempt of men to classify them. This part of Biology that aims to classify organisms in a systematic order is called taxonomy. The classification of data is the first step in any investigation. The objects acquire significance when they are classified because they facilitate a comparison between objects, which leads to the understanding of their nature (Foucault, 1966; Whitehead, 1970).

In 1850 the bases of the natural history museums were revolutionized by Charles Darwin. All community sectors interested in museums increased. At the same time, the value of the scientific work made the museums gain reconnaissance not only in academic aspects but also in economics. From this period, the private museums declined. They were intense through the XIX century and some still exist nowadays. More and more, however, museums belong to scientific societies or to State associations (Whitehead, 1970).

3.2 Museums today

Many researchers around the world study biodiversity. Nowadays, the basic documentation of biodiversity is found in scientific collections at museums, institutions and universities (Silveira & Oliveira, 2008) split all over the world. The main goal of the natural history

museums is to store, maintain and organize collections of specimens that represent the biological diversity of organisms (fossils and modern) that once colonized the Earth (Zaher & Young, 2003).

Several kinds of collections with different aims exist. The most common are for teaching purposes, for scientific research and with economic interest (Martins, 1994). In this chapter we will only discuss the scientific ones. Scientific collections exist for all kinds of materials. Some of them shelter millions of samples that may contain a diversity of animals, parts of animals, or even of objects or signs that belong to the species. As examples, one may find nests, shelters, footprints, excrements, hairs, etc. It is possible to appreciate different kinds of collections with different purposes. An anatomical collection will contain a lot of bones, parts of bodies, organs, etc. In a biogeographical collection it will be possible to see specimens from different parts of the globe that correspond to their distribution.

Scientific collections represent a crucial source of information for those who work with living things. They are of great importance because they help in education and scientific activities, providing reliable information about all animals (Silveira & Oliveira, 2008), including samples of the extinct fauna. Under the molecular revolution, they begin to provide genetic banks where tissues are stored for further studies. They also cover strategic areas of governmental issues like environment management, agronomics, medical and pharmaceutical research, having serious implications at all levels of society. These collections also represent a cultural legacy. Finally, they play an important role in the professional formation in several careers, providing increasing qualification to face the challenge of a sustainable development. In this sense, collections constitute an essential source of data for studies of environmental impact (Zaher & Young, 2003).

A great zoological collection keeps biological material on all kinds of groups from all over the world. Normally the groups of animals that most researchers work with are the major ones. They are in public institutions, usually in museums and universities. It is thus possible to deal with two realities or perspectives: large collections and small collections.

Large collections (usually in museums and institutions) commonly count with large funds and investments for huge gathering expeditions with adequate staff to maintain the collections. In counterpart, small collections (usually inside universities) are not necessarily strategically located, being usually regional, peripheral, and cannot afford neither small nor larger expeditions. In these marginal collections, expedition expenses (transportation, equipment, alimentation, accommodation, etc.) and collection management are under the responsibility of the researcher.

Clarifying, material in a collection requires massive dedication to keep the biological material in good shape for future users and to extend its lifetime. The following activities are examples: material that is preserved in alcohol must be refilled to avoid dilution of preserved liquid; bottles must be verified for adequate levels of preservation liquid to avoid desiccation; large animals need taxidermy; bug collections need attention against ants, fungi, etc. All of these cares need effort and time. Inappropriately stored material reduces the utility of the collection. For this reason, important collections that were gathered for decades of hard work have been lost. Since these scientific collections represent national and international heritage, the maintainer institutions must be in tune with the needs that a scientific collection requires to be in good conditions for future users (Martins, 1994).

Each species has a specific methodology for gathering and preserving. The animal world is vast, with more than 1.5 million known species. This represents a huge restraint for zoologists since it is impossible to collect, preserve and study all zoological groups. That's one reason why zoologists must limit themselves to study only specific groups.

As collections grow according to the differently available human specialists, one may find a very complete representation of one group in museum x, and another very different group in university y. Because of this, exchange of materials and researchers are promoted, as loans of material are needed for the development of particular scientific activities. It is clear that a vast and close relationship between institutions and researchers is desirable and mandatory (Martins, 1994).

A standard procedure is that zoological collections keep (when possible) more than one copy of each species. The model organism, used to describe and fix the name of a species, is called the holotype. This specimen usually remains in the collection and may leave only in very special conditions and exceptional occasions. Other copies are often borrowed, exchanged or donated. Besides such exchange of material, it is usual that a scientist plans visits to particular collection of his interest for research. Sometimes specialists are requested to assist on some particular difficulties or even to teach courses.

The professional responsible for the collections is the curator. One of his tasks is to manage all the data that is produced within the collection. Some collections or institutions have their own policies for using their records. However, various categories of data may exist: those that are only interesting for institutional issues; those that are of restricted use, needing a permission for access (unpublished data); and those of free access to the public (published). Either way the uses of those data may be restricted to scientific, educational and public management. Notwithstanding, recommendations are usually made for future handling of any of the data used. For example, the specification of the collection to which the zoological material belongs is usually demanded, etc.

All these normative designations, policies of access, and eventually any misunderstandings within the collection are elucidated by the curator in smaller collections or by committees and advisory boards at the large ones. Therefore, the curator must also act as a public relations manager.

4. Researcher's conduct

As we saw, great collections benefit from great funds. But biodiversity is not concentrated only in the vast scientific collections. A lot of important material is preserved in minor institutions. These peripheral collections are frequently forgotten. Resources, interests, time, support or special guidelines to make good collections are often missing. Most of the time, the management is made by the professionals themselves and the money necessary is provided by the researchers. The scientists, who use the zoological material from the collection, usually work together with the curator. This association guarantees some basic conditions and guarantees the continuing survival of the collection. As peripheral collections are usually smaller, each research becomes responsible for the group he works with. Collecting, identification, fixation, cataloguing and administration in practice become the responsibility of the scientists. This excessive dedication by the researchers makes them feel much attached to the animals-objects studied. This may sometimes retard the optimal collaboration between

institutions because the researchers feel like the owners of their study material. There are those who go to such extents as to hide samples from other fellow visitors.

It is known that when a researcher from another institution arrives with the intent of studying a specific taxonomic group, he may encounter only a few broken, dried, immature, or otherwise scientifically less relevant data for the research in question. This may be equally true when material is requested on loan. The institution tries to avoid any chances of loosing material, refraining to loan to marginal collections or unknown researchers. This attitude is also enhanced by recent cases in which "international" material, already borrowed and on its path to the loaner, is detained at customs by the federal police and, sometimes, burned[4].

Although scientific collections are of public domain, in theory, and therefore are accessible to consulting by other scientists, when new researchers arrive with a claim to study a specific group, conflict may arise (Fig. 3).

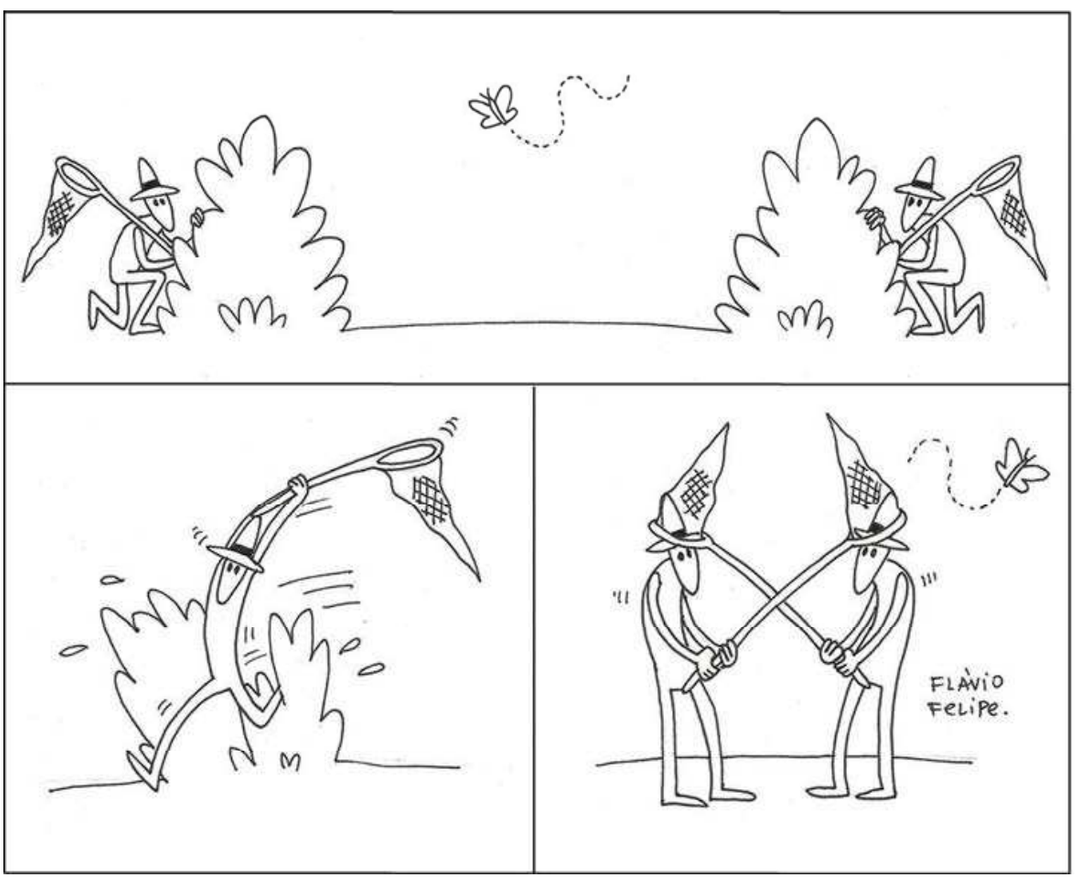

Fig. 3. Competition among researchers may occur for the same study group.

This is particularly true when these groups are already being studied by researchers or students at the institution in which the collection is housed. Scientists working on a group

[4] This has happened even when the necessary permission documents were avaiable, due to wrong interpretations by the police officers in the particulars regarding the objects under study.

thus believe that they have some priority over the material they are studying for some reasonable amount of time (especially if the animal has some peculiarity as being an endangered species, a rare species, or a very difficult animal to collect – there being very few specimens in the collection). These assumptions may not always be entirely correct. Notwithstanding, for ethical reasons, the curator must respect those working on this group when new researchers arrive. In cases like this, the curator has to find a solution for both scientists to be able to work.

> Can both do the same work?
> If not, who is going to change and why?
> What are the criteria used to decide?
> Does this mean that only the older researcher working in a collection has the privilege/right to work on it?
> Will the other researcher need to find another institution to be able to work on his group of interest?

Proposals are made aiming at a resolution[5].

In traditional collections there usually is an established policy which is respected by those who work in the institution. For example, the paleontological protocol dictates that, while one researcher is writing primary descriptions of new material, other researchers cannot study it. In practice, that often means waiting years or decades until a senior researcher finishes a detailed reconstruction of the fossils under his charge (Gee, 1999). Probably this paleontological resolution was defined only after a huge quarrel centering on two 19th century zoologists, Cope versus March, over fossil bones, also known as the great dinosaur rush (Colbert, 1984). Each used devious methods to try to out-compete the other in the field, resorting to bribery, theft, and destruction of bones. Each scientist also attacked the other in scientific publications, seeking to ruin his credibility and have his funding cut off (Penick, 1971; Romer, 1964).

Another situation is also real: big collections tend to suffocate the marginal collections when projects such as making data available on internet and publishing catalogues are planned. Large collections usually house large amounts of previously published material, while smaller institutions are prone to be in the act of collecting, identifying and planning future publications. The first ones often use their coercive powers to obtain the rights over all unpublished data, claiming to avoid delays in making information public. This creates a natural resistance when researchers at these smaller collections are asked to simply share all their unpublished data. These events seems to be like vicious cycles and therefore justify why scientist tend to defend "their data" or "their collection".

5. Discussion

5.1 Power conflicts

We realize that the universe of science is a social world. Consequently, impositions and solicitations are made. The scientific field, as any other (religion, industry, arts), is a ground

[5] A recurrent, although not entirely satisfactory solution, is to convince one researcher to change the animal group or to alter significant details of his research project. That's one of the reasons we may see, more and more often, very similar projects, differing only in the species, the place of study, or the method to be applied.

compounded with relations of strength. These strengths compete with each other to maintain or to transform the field in question in order to benefit one side. So, the scientific field can be described as a physical and ideological world that comprises relations of strength and relations of dominance. Strength is determined by how much the scientific community knows you through your work, and dominance is connected to the issue involving hierarchy, which is not separated from the first aspect. These relations are determined by the distribution of scientific capital (Bourdieu, 1984).

In a simpler way, scientific capital represents a form of power. For Foucault (1979), the power is not a natural object or a thing, it does not actually exist. What exist are social practices or relations of power. Therefore, power is not a unique or global entity. It exists in disparate, heterogeneous forms and is always in constant transformation. As such, it is built historically. It may be represented in a central or peripheral situation, in a macro or micro level. Which means to say that power is something exercised, performed, functional (Foucault, 1979) and is therefore symbolic (Bourdieu, 2002). It is struggle, confrontation, the building of strength relations in strategic situations. It is not a place to occupy, nor an object to own. It is not even univocal, a one-sided situation. In this struggle, you may lose or win. Power is a producer of individuality. The individual is a production of power and knowledge. All knowledge, scientific or ideological, can only exist under political conditions. These conditions are necessary to form the subject as the knowledge domain. The fundamental aspect of this analysis is to realize that knowledge and power imply reciprocity: there are no relations of power without the constitution of a knowledge field, as also the reciprocal, all knowledge constitutes new relations of power (Foucault, 1979).

There exist two forms of scientific capital that correspond to two forms of power: the political and the specific. The political power is temporal and it is connected to the fulfillment of important positions inside the institutions, laboratories, departments, boards. This kind of power reflects the possibility to command the scientific production through evaluation boards, as chief-editors, administrators, etc. The specific power is that strictly connected to the research, to the study. It will provide prestige and reconnaissance (Bourdieu, 1997).

Based on those ideas the collection, as well as the museum, the institution and the researcher, are characterized by their own capital. The volume of capital determines its space and strength. These capitals are compared to each other and also to the physical structure into which they are inserted. Depending on the fragility of their capital, the results from these comparisons may be hard to accept by the individuals involved (Bourdieu, 1997). For example, a powerful zoological collection should be sustained on these foundations: a good representation of animals; a large structure with sufficient capacity to conserve the specimens in an ideal way; a group of employees and a group of scientist working and publishing their efforts; and investment funds. So, a powerful zoological collection would aggregate both sorts of scientific capital: those that provide the physical structure and those that provide the intellectual structure. If one of these foundations is week or is missing, then you lose capital, i.e. a great scientist cannot work in plenitude with badly shaped specimens, or a large collection is worthless without specialists working with it. So any basic fragility affects the possibility to obtain funds for research.

When the strength of a collection is found in the amount of material deposited, it is very profitable because this museum, collection or institution becomes the first choice to store

material or even to receive financial support. The bigger the collection, the higher the possibility to work with different taxonomic groups and therefore the probability of publication increases. The merit of a museum goes not only to the researchers but also to all the agents that participate in the institution: the keeper, the guard, those who work with marketing and public relations, the director, counselors, and so on.

Unfortunately, not all collections have comparable scientific capitals to work with. Usually peripheral collections can only count with the students and researches for cleaning, managing, and financial support. That's one reason why their stored material cannot produce much beyond the local biodiversity. That's all the money investment and structure can afford.

In a strict sense the largest funds for collections are obtained by their researchers (past, present and future) that, beyond their efforts, manage to support and to start new projects or to continue old ones. For example, in the Brazilian evaluation system a researcher has more credibility and facility to have his project approved the more he has already accomplished. So the strength of a researcher is determined by the quality level of his curriculum, which is reflected in the amount of publications, titles, projects, financial history, awards, etc (Oliveira, 2009). Having a good curriculum may facilitate being invited to participate in committees, to be a coordinator, an evaluator or to belong to other bureaucratic functions. Equally, you may find professionals that, although they do not have the best curriculums, end up assuming these higher positions. This becomes a tool to get financial profits. For Bourdieu (1984) the academic administrators could be a compensatory substitute for the non-accomplishment of prestige by means of research. Either way, both cases reflect conditions of power.

One of the highest valued scientific accomplishments is to obtain recognition for the development of science, in the form of inventions, discoveries and publications in the most prestigious publishing houses (Bourdieu, 1997). Our discourse promotes recognition. Considering that not everyone can discuss all subjects at any one time, the discourse in an article represents the power that you have over that specific area of knowledge (Foucault, 1971). This striving for the reconnaissance of our accomplishment explains much restraint in the sharing of primary zoological information. There is always conscious or unconscious fear that someone else will achieve prestige ahead of us. This is quite interesting when compared with animal social behavior. Notwithstanding how awkward it may seem, sometimes scientists act as if they were protecting their animals-objects-data, in the same way that animals may protect their territory. This struggle for data only occurs because the number of publications and citations give prestige to authors in the scientific world (Christoffersen et al., 2009). This provokes a dispute of egos accompanied by a distorted notion of power associated with a pseudo-hierarchy created by the amounts of publications. Resembling territorial behavior, which becomes manifest as sympathy for the objects of study, this may result in lifetime disputes among scientists. All these little conflicts delay the rapid dissemination of information and reduce efficiency in the retrieval of data. It also may create awkward personal conflicts of interest, for example, regarding authorship of eventual papers to be published (Fig. 4).

It could be stated that the enigmatic aspect of such protection does not reside in the actual possession of the collections themselves, but in the knowledge capital that can be generated

from them through publications and recognition in the scientific community. But this is not entirely correct. The emotions of the scientist cannot and must not be separated and neglected. Let's explain why. Usually in any zoological collection there exist a certain number of taxonomic groups that are in standby because there are no researchers to work with them. So, if the only correct premise where to obtain scientific prestige, the biologists would fight over obtaining the whole collection for themselves, since there is plenty of data available to fulfill this objective. Instead, they only struggle for one or two groups. The situation is more complex than it seems to be at first site, and it could also be extended to a lot of other scientific areas (i.e. psychology, history, philosophy, etc.) not to mention just sociology. As Edgar Morin (2005) loves to assert so strongly, we must not mutilate reality into a few specific areas of knowledge, we should try to understand the reality in its own complexity.

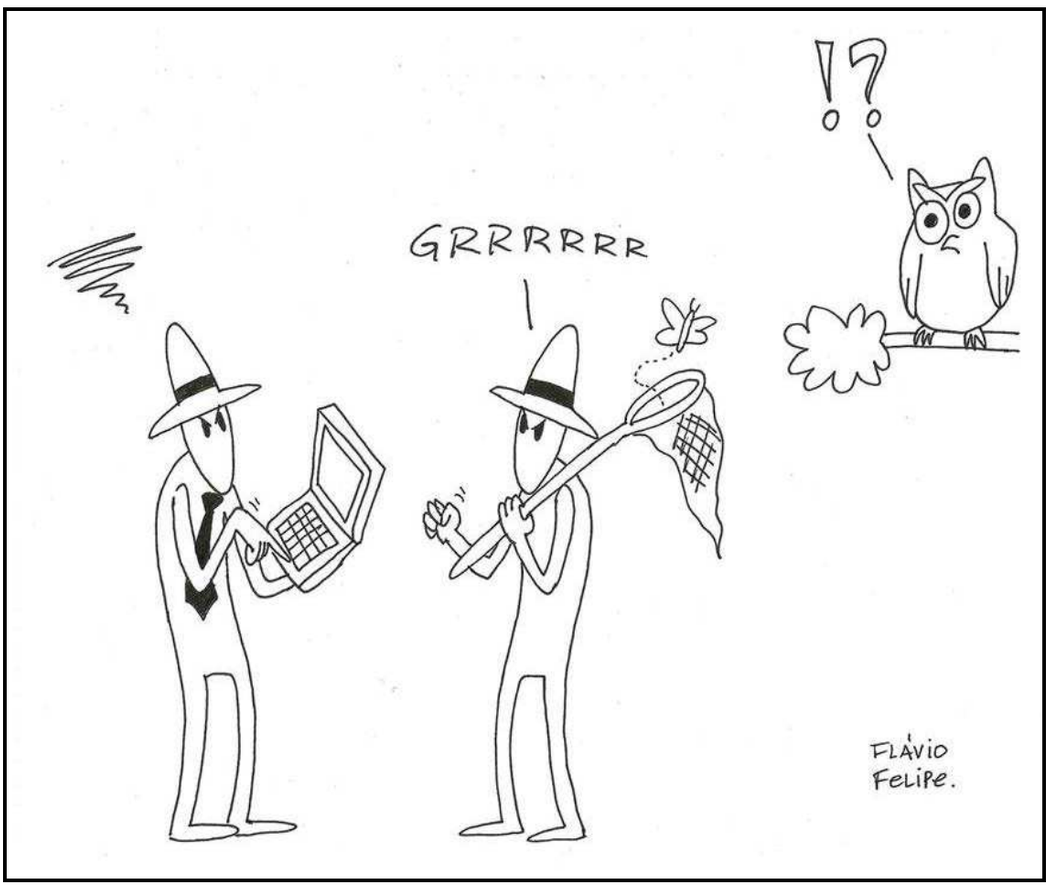

Fig. 4. Territorial (=unpublished data) conflicts among researchers.

Looking at this picture of zoological collections, we can do an analysis from three points of view: the relations of Scientists x Scientists, Scientists x Institutions, and Institutions x Institutions.

The relationship Scientists x Scientists may be disturbing when foreign visitors arrive to work with the same taxonomic group, especially with the same project. This is awkward because the local researcher may feel like he's being injured by the new company. Therefore,

he feels the need to fight for his rights, defending "his" animal-object as if it were his own property (=territory). This also affects special issues concerning publications:

Will my chances of publications be harmed?
Will I or should I establish a partnership?
Who is going to be the first author?
Who will take the credit for the novelty of the work?

But in some cases, when this foreigner is a specialist in the animal-object in question, there's an interest in establishing the partnership. Pretty interesting! In such cases the threat turns into profit. The scientist that, in a first instance, posed as having the "rights" (=power over the animal-object studied), in a second moment donates all his power to share these rights (=authorship). This represents a struggle for the second scientific capital, the specific one.

The relation Scientist x Institutions is a bit more complicated because the collections, as the researchers working in it, are under the control by those with administrative functions (=power over the decisions about investment funds and over the physical structure of the collections) (see Waast & Gaillard, 1992). These last may be of two instances: only bureaucrats or scientists as well. The first usually doesn't feel attached to the collection because they no longer do research or never did. The "political scientist" that still does some research may create affection for the collection. There are plenty of possibilities, but two of them are most popular: when a visitor arrives to work with the same group, the chances for that to happen are minimal (who is going to take the work of the boss?); or he may sympathize with the person and propose project supervision with a fellowship, or some other form of collaboration.

Regarding professional relationships, a researcher may develop a charisma for his institution and fight for it (sometimes becoming territorial in the sense of not wanting to lend materials and not authorizing loans). In another situation the institutional commander may not sympathize with some researcher from his own or outside institution, thus arranging innumerable restrictions or obstacles.

So, inside the relations Scientists x Institutions, political power itself is at work, or then political power associated with some specific power.

The relation Institution x Institution are always seen as profit[6]. In spite of linguistic, cultural and ethnic differences, the alliances (national and international scientific exchange) can be very productive, opening new perspectives for the development of technologies (Christoffersen, 2002). If you took a deeper look you will realize that these relations will be steered by the other types of relationships discussed above.

So inside collections there exists a whole hierarchy of science coercing. In other words, the administrative and the research person, each one pulling the rope to his side, delimit the boundaries of possibilities for each other. There also exist, inside and outside of this hierarchy, invisible disputes, or other subtleties for the gain of power. On the bureaucratic side this is reflected by the possibility of control or even by the capability for decision in several areas of administrative procedures and physical structure. On the researcher side,

[6] Except when alliances results in unequal relations: when 3rd world scientists are treated as helpers, cheap labor and of limited intellect (see Christoffersen, 2002).

this power is reflected in prestige, which is assigned to the number of publications[7] or, in an indirect way, to the possession of the animals-objects that will provide data which will result in publications. So, all this behavior (try to continue being the only one to work with a group), aggravated by the anguish of feeling threatened by our neighbor (since all scientists are clients and competitors at the same time, as Bourdieu affirms), would be similar to the territorial defense of social animals. This could be justified by the pressure that all researchers suffer as a consequence of the scientific system, especially those scientists that are inserted in a small, local, regional, peripheral and marginal collection.

5.2 Ethical implications

One of the causes of all such disputes is provoked by the disagreements that may arise concerning the authorship of the works in publications.

> Does one invite the other fellow researcher who works with the same group as me? Should I or must I?
> Should I include the name of my fellow (invite him to participate in my paper) for ethical reasons even if he didn't collaborate with it or only collaborated eventually?
> Should I invite him only for interest in future partnership?
> What if I publish my work all by myself? Will this occasion discomfort? Would the other researcher try to harm me at my institution?
> Which decisions are ethical?

All these questions may pass throw the researcher´s mind. Who should decide how to answer them? Each collection has its own policies or habits. There are those who adopt the following criterion: if one did the work alone then one publishes alone and therefore receives all the prestige. Others opt for publication in groups, with partnerships, and therefore for each new publication the whole group will participate again. This is particularly profitable, considering scientific evaluation nowadays.

These questions are quite difficult for the scientist to answer considering the nature of ethics. The individual and society have a double nature. The individual has the powerful principle of egocentrism that stimulates him to be selfish while the society has rivalry, competition, and struggle between the selfish. Society doesn't manage to impose its ethical norms to all individuals. These don't have an ethical behavior that overcomes selfish behavior at all times. This problem becomes worse in very complex societies, where the integration of traditional sympathy bonds is inseparable from the development of individuality (Morin, 2004). Remember that individuality is produced by power (Foucault, 1979).

Ethical sources are also natural because they are older than humanity. The principle of inclusion is prescript at the self-socio-biological organization of the individual, which is transmitted through a genetic path. Mammal societies are communal and rival; they feel at the same time an egocentric conflict and sympathy for the enemies outside. Sympathy for

[7] We do not agree with such a simplistic evalution system inside the sciences, because it leads to an artificial partitioning of a scientific work into as many articles as possible, reflecting the greeds of the professional, who, seduced by this system, aims to take maximal advantages of it. This is also a consequence of manufacturing sciences, who see all the professionals as employees (see Callon & Foray, 1997; Oliveira, 2009).

the struggle against a prey or predator; rivals for alpha males, in fights for primacy, for domination, for conquest of females (Morin, 2004).

Human societies developed and incorporated this double sociological character: the interest-rivalry relation and the community bond. The feeling of community is and will be a source of responsibility and sympathy, and these are sources of ethics. Individuality is the source of personal responsibility by your life conduct, and it is also the source of strength of egocentrism. It grows in all fields and tends to inhibit the altruistic and sympathy potentialities, and this contributes to the disintegration of several groups (Morin, 2004).

The bases of ethical crisis belong to a general crisis of the certainty foundations: philosophical knowledge foundation crises and scientific knowledge foundation crises. This is emergence without knowing what emerges. Ethics, as emergence, depends on the social and historical conditions that make it emerge. But it is the individual that makes ethical decisions. It is his duty to choose his values and finalities (Morin, 2004).

So ethics is a relative aspect and that's why some institutions and museums, that usually have a large structure, utilize committees of morals or councils of ethics to decide about authorship, among other things. Usually these places have a previously established policy to follow. In this way, an uncomfortable situation may be avoided. In smaller collections these boards do not exist and the decisions of possible conflict are solved by the curator or even by the professionals themselves. In these cases the problems usually turn into personal problems, where the scientist does not differentiate professional from personal life, since he feels like the owner of the taxonomic groups.

This is one of the reasons why all zoological collections should implant an ethical committee, no matter how small they are. The optimal would be to standardize some protocols to be followed, for example:

1. All material in the collection can be studied by anyone who wishes to, with few exceptions:
   a. This material is already being studied at that specific moment in that same collection, and, therefore, there is no reason for two persons to develop the same project with the same group.
   b. The researcher is not connected with any institution or university program.
2. All research must result in scientific publications.
3. All material that is deposited at the collection is a public property under the guard of the institution.
4. All the right of the research is of the scientist, who must quote the collaboration of the collection and institution.

This protocol should take into account the particular needs of each collection. For example, consider the differences as well as the similarities between an entomological and a mastozoological collection. The elaboration of such a protocol should be accompanied by a juridical foundation, despite their particularities.

5.3 Beyond collections

We realize that the interest conflicts observed in this chapter are verifiable in other biological areas as ecology, ethology, etc. Actually such a conduct pertains to all non-scientifically fields with human interactions, as in medicine (doctor-patient relationships), in

hierarchical positions in a factory (boss, manager, workers), in public transportation (driver, collector, passenger), etc. Moral pluralism is real and ever present, affecting professional relationships (Englehardt Jr., 1996). Thus there is a primacy for ethics, according to Emmanuel Lévinas (Hughes, 1998). A new basic philosophy of bioethics is becoming fashionable to deal with moral diversity. If such a bioethics is ever possible (Engelhardt Jr., 2006), it must concern the relationships between nature and human beings, must value relativism, and must be grounded on the traditional ethos of each region (Sakamoto, 1999). In any case, bioethics becomes necessary to advance scientific knowledge in all areas of human interaction. The basis of such an integrated ethics is rational and naturalistic, that is, biological and evolutionary (Chiarelli & Birolo, 2011). Our present moral philosophy must be directed to guarantee the survival of man as an individual or as a group of individuals co-operating and living together in peace within communities.

In this context, we believe that the discourse ethics in Jürgen Habermas' moral theory is enlightening (Habermas, 1990). According to this author, language is the bridge that connects people and communication is a countervailing force against arbitrary power (Vandenberghe, 2011). Practical questions can in principle be settled by way of argumentation. Emancipation refers to a learning process by which a subject experiences how to change when it learns to see itself through the eyes of others (Habermas, 1971). Thus discourse ethics, as well as playing a role in justifying the ethical principles that underlie contemporary liberal democracy (Habermas, 1998), also provides a perspective for reconciling the powers inherent in real, practical discourse.

When pre-established ethical norms and ethical commissions fail to resolve pending conflicts, successful communication among confronting parties remains a last resource for reaching an agreement and mutual understanding. An agreement may be considered fair when all parties concerned have been afforded a maximum opportunity to give reasons or to state arguments before a final decision is reached. "Only those norms can claim to be valid that meet (or could meet) with the approval of all affected in their capacity as participants in a practical discourse" (Habermas, 1990).

We also find that what Hans-George Gadamer has said on philosophical hermeneutics is relevant to dialogue and conversation, as a guide to the interpretation and understanding of other peoples thinking when this conflicts with our own views. This is what he says: "Conversation is a process of two people understanding each other. Thus it is a characteristic of every true conversation that each opens himself to the other person, truly accepts his point of view as worthy of consideration, and gets inside the other to such an extent that he understands not a particular individual, but what he says. The thing that has to be grasped is the objective rightness, or otherwise, of his opinion, so that they can agree with each other on a subject" (Gadamer, 1979).

Bohm et al. (1991) established three basic conditions of dialogue: (1) Participants must suspend their assumptions; (2) participants must view each other as colleagues or peers; (3) in the early stages there needs to be a facilitator who 'holds the context' of dialogue.

Through conversation, testing our prejudices, searching our meaning, we become more critical (Smith, 2001). We may even be able to catch the collective consciousness (Bohm, 1996).

6. Conclusion

This chapter shows that zoological collections face a sociological issue of knowledge production and ownership. We realize that not all zoological collections are characterized by these kinds of antagonistic relationships. But, in a straightforward sense, animal collections are properties that require tremendous investments in money, time, and expertise for their acquisition and management. Although biodiversity information is an intellectual property of the institution in which the collection is housed, the access to these properties must thus be guarded or regulated at all costs.

Paradoxically, scientific knowledge is increased through its vast dissemination. It is crucial that the knowledge capital that can be generated from scientific collections, in the form of publications and general recognition in the scientific community, can be of free access. In other words, in spite of unpublished data, the biodiversity information obtained by means of public investments must be of open access for public use. The adequate and wide uses of such biodiversity information will increase their appreciation as an institutional resource. Their misuses and unnecessary restrictions will compromise their utility.

The puzzle, then, is how to transfer the actual possession of collections themselves (the property rights), to other researchers capable of generating from them the best knowledge capital that these collections potentially provide without promoting disagreements. We know that marginality and creativity are not opposed conditions (Christoffersen, 2002; Gardner, 1996). That is why cooperation and synergism are thus crucial elements for the rise and propagation of scientific knowledge. Great partnerships and joint projects are also accomplished by many scientists who work in laboratories (Joly, 1997).

Thus, defining who will have access and do research on these institutional biodiversity repositories becomes fundamental for defining the conditions of a research protocol and establishing collaborations.

We have tried to expose the reality found in some biological collections. Ethical, financial and framework problems were depicted in order to understand collection dynamics. We realize the level of complexity that emerges from these considerations. Notwithstanding, we do not attempt to solve these problems by offering a banal, simple and, perhaps, utopian solution. Instead, we leave here a first step for future considerations. To conclude in a nutshell, we have reflected that only what people manage to agree upon will represent the rule or arrangements to be followed.

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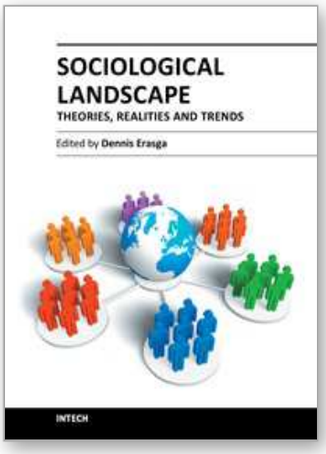

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