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# Tracing identities through interconnections:

The biological body, intersubjective experiences and narratives of suffering

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## Abstract

The 1987 radioactive disaster in Goiânia – a ‘critical event’ – revealed the formation of new identities in opposition to the notion of *radioacidentados* (radiation victims), a classification established by the system of nuclear expertise and defined exclusively by the person’s absorption of high-level doses of radiation. In the search to give meaning to their illness and suffering, new social subjects have emerged and elaborated new interpretations concerning the materiality of contaminated bodies. In narrating their subjective experiences, they situate their identities as victims in relation to the embodied experience of the contaminated site and the attribution of new meanings to certain objects associated with the disaster itself and nuclear technology in general. The text focuses on this articulation between the biological body, narratives, memory, ‘things’ and the constitution of social identities. It provides a historical analysis, supported by a multivocal ethnography of the Cesium-137 disaster.

**Keywords:** Radioactive disaster; narratives; place; embodied memory; material culture; victim identity.

## Resumo

O desastre radioativo de Goiânia – um “evento crítico” – expôs a formação de novas identidades sociais que se opuseram à configuração de “*radioacidentados*”, uma classificação estabelecida pelo sistema perito nuclear e definida exclusivamente pelas altas doses de radiação. Na procura pelo sentido da doença e do sofrimento, percebidos como causados pelo desastre, novos

sujeitos sociais emergiram e atribuíram novas interpretações à materialidade dos corpos contaminados. Narrando suas experiências subjetivas, eles posicionaram suas identidades de vítimas em relação à experiência corporificada do lugar contaminado e na resignificação de objetos próprios à história do desastre e à tecnologia nuclear. Este trabalho focaliza a articulação entre corpo biológico, narrativas, memória, “coisas” e a constituição de identidades sociais. É uma análise histórica com base em uma etnografia multivocal sobre o desastre com o Césio-137.

**Palavras-chave:** Desastre Radioativo; Narrativas; Lugar; Memória Corporificada; Cultura Material; Identidade de Vítima.

# Tracing identities through interconnections:

The biological body, intersubjective experiences and narratives of suffering<sup>1</sup>

*Telma Camargo da Silva*

## Introduction

*When society deals with risks, whether of aggression, natural hazards, or a controversial technology, it is engaged in a political process. The politics concern allocation both of tangible benefits and costs and of symbolic assets and liability.*  
Ingar Palmlund (1992)

The new scientific fields and technologies developed over the course of the twentieth century brought with them diverse forms of experiencing social relations, narrating suffering, and problematizing the power relations entangled in knowledge production, stimulating the social sciences to investigate and interpret these new configurations. Among these newly consolidated fields was radioactivity<sup>2</sup> and its gradual applicability in two areas that are closely interconnected, though understood by many as separate realms: the so-called ‘peaceful’ uses with ‘positive effects,’ and the misuse of the technology, grouped under ‘negative effects.’ In the first group of uses, an extensive literature has documented the use of radioactivity in research

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<sup>1</sup> A previous version of this work was presented at the roundtable ‘Biosocialities, institutions and spaces of identity from a comparative perspective,’ coordinated by Carlos Guilherme Octaviano do Valle at the 28<sup>th</sup> Brazilian Anthropology Meeting (28<sup>th</sup> RBA), held in São Paulo, 2-5 July 2012.

<sup>2</sup> Radioactivity was discovered in 1896 by French physicist Antoine Henri Becquerel. “A uranium rock left forgotten on a blank photographic film led to the discovery of an interesting phenomenon: the film was stained marked by ‘something’ emerging from the rock, named at the time rays or *radiations*. Other heavy elements, with a mass close to that of uranium, such as *radium* and *polonium*, had the same property. The phenomenon was named *radioactivity* and the elements displaying this property were called *radioactive elements*” (Alves et. al., n.d.: 05). The name radioactivity literally means the activity of emitting rays (from the Latin *radius*) (Luz n.d.) As a tribute to this scientist, the unit measuring the number of nuclear transformations per unit of time is called a Becquerel (Bq) (Azevedo n.d.: 29).

centers, nuclear medicine, radiotherapy, agriculture, industry and energy production. The second group includes atomic bombs, radioactive disasters and nuclear weapon tests. In both cases, the discovery of radioactivity has led to particular forms of experiencing social relations permeated by the risk of radioactive contamination. While nuclear science has invented specific instruments and measurements to understand and control the materiality of something immaterial – radiation – without color or smell, flavorless and silent, the narratives of the survivors of the Cesium-137 disaster in Goiânia actively subvert the objectivity of the official dose classification used to determine which people have been exposed to radiation. The present analysis is informed, therefore, by the following questions: How do the experiences of people in a radioactive emergency situation compare and contrast to the technical rationality and disciplinary knowledge of nuclear experts? How has the materiality of the disaster exposed the power games involved in classifying the affected population? How has the ‘work of memory’ (Jelin 2002) appropriated technical-scientific knowledge in order to redefine belonging to the disaster?

In this work, I turn to my own earlier research<sup>3</sup> on the Goiânia radioactive disaster,<sup>4</sup> reviewing my previous inquiries (Silva 2010, 2009a, 2009b, 2007, 2005, 2004a, 2004b, 2001, 1998a, 1998b, 1997) in order to analyze how the contamination site is constituted by the bodily experiences narrated by different social actors of this event: the victims, *radioacidentados*,<sup>5</sup> the neighbors of the

3 Ph.D research project *Radiation illness representation and experience: the aftermath of the Goiânia radiological disaster*, financially supported by the Wenner-Gren Foundation for Anthropological Research (Grant No. 5969 and Post-Ph.D./Richard Carley Hunt – Grant no. 7046). The analysis focused on the disaster and its aftermath over the period 1987-2001. The data collection involved active observation, audio and visual recording of open interviews and archive research. In this article, I have opted to use the real names of the people who have occupied (or currently occupy) public service posts, or who are prominent at an institutional-political level. Pseudonyms have been adopted for everyone else.

4 The Cesium-137 radioactive disaster, which officially occurred in 1987, was caused by the opening of a capsule belonging to radiotherapy equipment that had been abandoned by the then owners of the Goiânia Radiotherapy Institute (IGR), in the center of the city of Goiânia (Goiás – Brazil). The opening date of the equipment is stated to be the 13<sup>th</sup> September 1987 by some sources (IAEA 1988: 11) and the 10<sup>th</sup> September 1987 by other sources. The danger present from the 10<sup>th</sup> to 28<sup>th</sup> September 1987 is described as the “time of loss control” (sic) (Rozenal 1991: 10) of the nuclear experts, who only arrived in Goiânia on September 29<sup>th</sup> that year. Four people died in the days following the opening of the equipment and 249 others were officially found to have been contaminated (IAEA 1988). However, to date countless individuals have been trying to prove through the legal courts a cause-and-effect relationship between the disaster and their own physical and emotional suffering (Silva 1998a, 1998b, 2001, 2004).

5 A term invented by nuclear-medical expertise to designate the people who carry the physical marks of radiation on and in their bodies, whether visible signs of burning left by direct contact with the radioactive element (*radiodermites*) or the record of high-level doses of radiation absorbed and subsequently measured by various kinds of dosimeters in 1987.

radioactive contamination areas and the military personnel actively involved in the disaster management. Further ethnographic data from follow-up research undertaken in the field at different moments during the years from 2010 to 2014 is also evaluated. In order to define the place of contamination, the narrators picked out and gave new meanings to various ‘objects’ associated with nuclear-medical expertise: site hoardings, overalls, radiographs. I argue that the need for the effects of radiation to become materialized in people’s bodies – a requirement for them to be classified as disaster victims – mobilizes different artifacts: the equipment specific to nuclear technology and the things created in the disaster experience. Thinking through this materiality<sup>6</sup> provides a way for us to unmask the play of memory and power involved in defining the population affected by the disaster in Goiânia from a polyphonic perspective. This embodied place,<sup>7</sup> arising from the body’s experience, is signified by the narrativization of the subject (Casey 1996: 13-52). Place, body, artifacts, memory and narrative are, from this point of view, intertwined in the production of identities and able to express power relations and political processes.

In order to understand how identity is shaped in the context of a radioactive disaster – which, I argue, is in turn shaped by the embodiment of place – I highlight the central importance of the notion of radiation doses. Formulated in response to the demand for precision and objectivity, it is appropriated by distinct social actors and imbued with multiple meanings. The idea of scenario (Magnani 1996: 37-38), understood here as a product of dynamic social practices, allows us to locate the experiences of different social actors in the use of nuclear technology over the years. These actors include nuclear workers, non-nuclear workers, residents and the people affected by the radiation. The constitution of a field of knowledge – nuclear science – identified by the discovery of radioactivity, the invention of specific instruments and the formulation of measurement techniques particular to this new science are all reconfigured in the experience of radioactive disasters. The understanding of these scenarios frames the narratives that surround people’s interpretations of radiation doses and shape the biopolitics of the Goiânia disaster, as I shall analyze over the course of the article.

6 Analysis based on the contribution of Daniel Miller (2010:10) who declares that: “the best way to understand, transmit and appreciate our humanity is to give attention to our fundamental materiality.”

7 This concept is related to that of embodied memory, explored in my earlier work (Silva 2005).

## Scenario One

Dosimeters and discipline: creating a controlled risk environment from the viewpoint of the nuclear expert

A nuclear technology scenario is configured first of all through the ambivalence of radiation itself, the immateriality of which presents a very real material danger. The physical characteristics of radiation demand the creation of new parameters of measurement and control, along with the invention of new equipment to check for and record its presence, the so-called dosimeters, including radiographic films,<sup>8</sup> thermoluminescent dosimeters (TLD),<sup>9</sup> Geiger-Muller counters and the pen dosimeter.

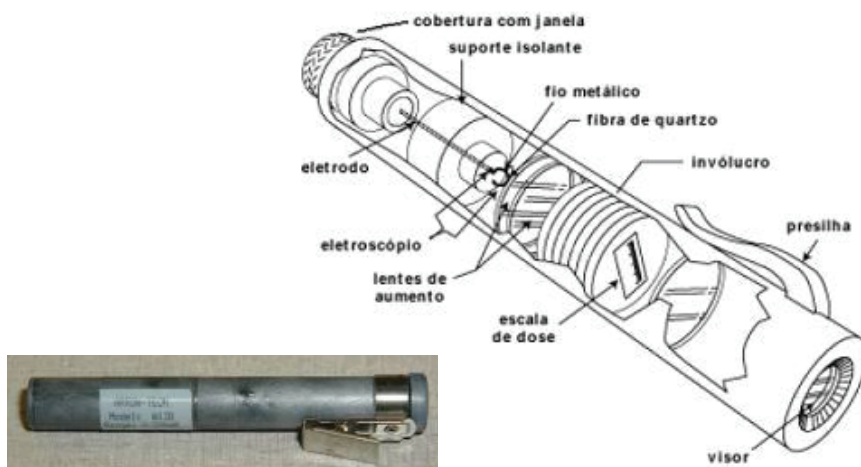


Image 1 – pen dosimeter<sup>10</sup>

Developed in response to the need to detect radiation, this technology reflects the idea that radioactivity can be objectively measured through the use of special equipment and analyzed with complete reliability in accordance with its own specific parameters, defined in order to quantify this new

8 “Radiation produces changes in the density of processed film (blackening). This allows the radiation exposure to be quantified. The use of filters helps to distinguish exposure to less penetrating types of radiation (beta) from exposure to more penetrating types (gamma)” (Oliveira n.d.).

9 “The thermoluminescent material used is based on the use of crystals in which the ionizing radiation creates electron-hole pairs. Through a thermal process, photons are released and can be collected by a photomultiplier. The number of photons released is proportional to the original load amount” (Oliveira n.d.).

10 The pen dosimeter was developed to assess the dose received by a worker during the performance of a given activity (Oliveira n.d.).

material phenomenon. The measurements – illustrated below – and their interpretation, along with the knowledge of how to operate the dosimeters, form part of the expertise of the nuclear specialist, articulated through the notion of radioactive doses. It is this capacity to measure the radiation dose (amount) to which an individual has been exposed and/or contaminated<sup>11</sup> that enables the nuclear risk to become a material reality.

- **Activity:** Bq. Number of nuclear transformations per unit of time
- **Exposure:** R (C/kg). Amount of load collected in a given mass of dry air
- **Absorbed dose:** D (Gy = J/Kg). Relation between absorbed energy and the affected volume (1 Gy = 100 rad)
- **Equivalent dose:** H = D.Q (Sv = J/Kg)
- **Effective dose:** E =  $D_T W_T H_T$  (Sv). Takes into account the irradiated tissue or organ.  $W_T$  is the weight factor of the tissue or organ.  $D_T W_T = 1$

Figure 1: Quantities and units used to assess radiation in the body. (Azevedo n.d.:29)

For the nuclear worker, knowing the dose received during their professional activity and understanding the measurements cited above are a matter of personal safety and radiological protection. In her study on the social construction of risk at the Angra I Nuclear Power Plant, Glaucia Silva states:

These measuring instruments start to be seen as protection mechanisms: because radioactivity is invisible and odorless, affording no means for our immediate bodily senses to detect its presence, measuring the dose is one way of feeling protected. (Silva 1999:141)

However, in a society where radioactivity is present in many areas of everyday life, not only nuclear workers depend on the control of these radiation doses. In this new modernity and what can be characterized as a risk society – with the nuclear sphere being one of its constitutive elements – the capacity to overcome fear and control risks depends on the trust invested in the system of expertise, where the nuclear specialist is a fundamental actor (Beck 1993[1986], Giddens 1991). In this configuration, the nuclear expert is

<sup>11</sup> The National Nuclear Energy Commission (*Comissão Nacional de Energia Nuclear: CNEN*) states that: “contamination, whether radioactive or any other kind, involves the undesired presence of a particular material in a given location where it is not supposed to be. Irradiation is the exposure of an object or a body to radiation, which can occur at some distance, without the need for direct contact” (Cardoso et.al. n.d.: 17).



responsible for ensuring the use of adequate clothing and equipment not only for his or her own personal safety, but also for the safety of all those in contact with radiation. Here the access to dosimeters and the ability to interpret the registered doses – informed by a risk-trust relationship, including belief in the objectivity of the measurements – makes nuclear experts the central authorities when it comes to recognizing the new legal identities produced in a situation of radioactive exposure, whether the ‘victims’ identified in the Goiânia disaster,<sup>12</sup> or, for example, the ‘sufferers’ in the case of the Chernobyl disaster in Ukraine (Petryna 2002: 2).

In this society permeated by nuclear risk – of which the Fukushima disaster<sup>13</sup> is one recent example – people’s bodies are regulated by techniques for detecting and evaluating radioactivity – techniques that have been created, implemented and regulated by the system of expertise developed by agencies like the International Atomic Energy Agency (IAEA) and Brazil’s National Nuclear Energy Commission (*Comissão Nacional de Energia Nuclear*: CNEN). In this first scenario, then, defined by nuclear scientific expertise, the body’s experience of radiation is perceived to be safe insofar as it is controlled by technological knowledge.

This disciplinary expert knowledge, which pre-determines bodily experience, is also pervaded by notions of time and space. Preventing the risk of cells being damaged by radiation is connected to controlling the period of time over which an individual remains in close proximity to a radioactive source and their specific distance from the same. In other words, the representation of the risk of radioactive contamination is understood through mathematical and objective parameters, while the technology has a disciplinary effect on the individual’s body. In this scenario, the narrative produced by the system of nuclear expertise on the effects of radiation precedes and

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12 The term used in the documents that define appropriate medical care and grant federal and state pensions (Goiás State Official Gazette, Decree No. 2,897, of 11<sup>th</sup> February 1988, creating the Leide das Neves Ferreira Foundation; Goiás State Official Gazette, Law No. 10,977, of 3<sup>rd</sup> October 1989, granting special pensions to the victims of the Goiânia radioactive accident; Federal Official Gazette - Law No. 9,425, of 24<sup>th</sup> December 1996, determining the provision of special pensions to victims of the nuclear accident in Goiânia, Goiás State).

13 The Fukushima disaster was caused by failures in the structure and operation of the Fukushima I Nuclear Power Plant in Japan, exposed when the region where the plant is located was hit by an earthquake and a tsunami on 11 March 2011. The disaster is still ongoing since many people are still displaced, the radiation has not yet been contained, and claims for official recognition as disaster victims and demands for compensation are still being processed. As well as contaminating the air, soil, plants, people and animals, the disaster also contaminated the sea. The Tokyo Electric Power Company (TEPCO), which runs the Fukushima Nuclear Power Plant, announced in April 2011 that it had started to release 11,500 ton of radioactive water, accumulated in the damaged facilities, into the ocean. In Europe the disaster gave a fresh impetus to movements against the use of nuclear energy.

shapes the experience of radioactivity, disciplining the body through technology. Created to deal with the demands of a laboratory environment and developed to protect nuclear workers, what are the implications, though, of using this paradigm to understand a radioactive disaster occurring in an open space and to people living their everyday life for thirteen days without being aware of the risks to which they were exposed, as in the case of the Goiânia disaster?

To discuss this question, I suggest a second type of radioactive technology scenario (*Scenario Two*), shaped by the uncertainties and ambiguities that emerge from disaster experiences and foregrounding the subjective and political dimensions of the notion of radiation dose. It also raises questions about the objectivity of radiation dose evaluations and risk perceptions. In the case of Goiânia, ever since the first phase of intervention by nuclear experts, the so-called emergency phase,<sup>14</sup> and reinforced over the years, the actions and relationships established with the affected people have been marked by inconsistencies and sometimes by secrecy – one of the motives for their social mobilization. Referring again to Beck's work (1993), this kind of society that he labelled catastrophic also contains a political potential, which can provoke reactions and mobilizations from the affected populations, as we shall analyze too in the case of Goiânia.

## Scenario Two

Hoardings / suspicions / uncertainty: the experience of living in a contaminated site

During the practical implementation of a mathematical rationality for radiation measurement, the landscape of Goiânia was marked during the emergency phase by the construction of red-stained wooden hoardings. According to the narrative of the nuclear experts, these screens were used to isolate the places with high-level doses of radiation – the so-called 'hot spots' registered by the dosimeters. Inside the hoardings were the contaminated houses from which people had been removed and isolated for decontamination. Outside the hoardings were the residents considered to be

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14 CNEN considers the emergency phase to be the period from September 29<sup>th</sup> to December 21<sup>st</sup> 1987. These activities are taken to have begun with the arrival of CNEN professionals in Goiânia and ended with the following actions: decontamination of sites with higher levels of radioactive contamination; demolition of contaminated houses and removal of radioactive waste to the Abadia de Goiás Temporary Radioactive Waste Storage Center (Rozental 1991).

uncontaminated and therefore allowed to remain at home and circulate freely in the areas close to the hoardings. This fact generated numerous doubts and questions concerning the boundaries of the contamination and the safety of living in the vicinity of the risk area visually and physically delimited by the site hoardings. Hence the hoardings became a symbol of the later exclusion of these “neighbors of the hot spot areas” from classification as victims of the Cesium-137 disaster, signaling the limits between risk/non-risk, and the fear elicited by the danger of contamination.



Images 4 and 05 – The site hoardings  
Photographer unknown – CNEN collection – 1987

The lack of official explanations capable of allaying the doubts provoked by these boundary markers and the fear of being contaminated mobilized the residents of the areas surrounding the hoardings put up in Rua 57. In December 1987 they created the Cesium-137 Victims Association (*Associação das Vítimas do Césio-137*). These feelings of fear and uncertainty were closely related to the theory found among some of Goiânia’s inhabitants that the government and the nuclear experts had kept the radioactive disaster secret for thirteen days. This theory was based on the fact that an international motorcycle race had been held in Goiânia during the same period that the radiotherapy unit had been removed from the *Instituto Goiano de Radioterapia* and opened up, and the radiation spread through the city center early in September 1987. Those maintaining this theory believed that, in order to avoid economic losses from canceling the event, a political decision had been taken to postpone the announcement that a disaster was taking place. In an interview I conducted with the Goiás state governor at the time, the latter, Henrique Santillo, denied any connection between the sporting event and the public announcement of the disaster by the government authorities.

Nevertheless, this interpretation of events is still maintained by some survivors even today, as I was able to observe during my fieldwork in 2014. Here it is also worth highlighting numerous other studies on radioactive disasters and nuclear bomb tests dating from the late twentieth century (Alcalay 1993 and 1995, Barker 1997, Bertell 1985, Garb 1997, Kaplan 1992, Paine 1987) which sustain a controversy over the beginning of these events. This topic has been given further impetus by the recent reports and media coverage of the 2011 Fukushima Daiichi nuclear accident, including accusations that the announcement of radiation fallout and the amount of radiation doses released into the environment is swayed by political rather than technical factors.

Returning to the creation of the Cesium-137 Victims Association, the outcome of a grassroots movement that sprang up in the wake of the Goiânia disaster, it is important to emphasize that this mobilization stemmed from: 1) the local population's unease concerning the methods used to evacuate residents from the affected areas; 2) the questioning of the secrecy surrounding the decisions and actions taken by the specialists during the emergency response phase of the disaster; 3) the understanding that a broader form of categorization was needed to acknowledge all contamination victims; 4) the clash with the federal and state governments over the adoption of a broader concept of healthcare, encompassing both physical and mental aspects and valuing people's nutritional needs; 5) the demand for individuals to be able to access the results of exams conducted by CNEN and the Leide das Neves Ferreria Foundation (FUNLEIDE);<sup>15</sup> 6) the coordinated work at national and international level with other popular organizations and local university institutions seeking support for their demands.

In the process leading to the creation of the Association, the victim identity is constructed in direct confrontation with institutionalized biomedical knowledge: the victimized body is not only the physically affected

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15 The Leide das Neves Ferreira Foundation (Fundação Leide das Neves Ferreira: FUNLEIDE) was created by State Law No. 10,339, of 9<sup>th</sup> December 1987, and instituted by Decree No. 2,897/88, of 11<sup>th</sup> February 1988, enacted by the then governor Henrique Santillo. It started to operate from the 29<sup>th</sup> February 1988 in the building of the OSEGO (Goiás Health Organization) Health Monitoring Office, on Rua 16-A, Airport Sector. It was there that parts of the radiology equipment containing Cesium-137 were left by Maria Gabriela Ferreira. This was the first site where radioactivity was detected. FUNLEIDE would be responsible for "continuing the work being developed by the Commission for Monitoring Cesium Victims of Cesium (Comissão de Acompanhamento das Vítimas do Césio: Cocesio), which was installed at FEBEM to provide support to patients suffering from radiation exposure" (*O Popular* newspaper, Goiânia, 26<sup>th</sup> February 1988, page 5). The foundation's name is in homage to the child severely contaminated by Cesium-137 who became the first fatal victim of the disaster.

body, as in the understanding of physicians linked to CNEN who use the term *radioacidentados* to refer to those suffering from radiation-caused lesions when identifying victims of the disaster. Members of the Cesium-137 Victims Association claim that the ‘invisible’ marks of the disaster, such as the disintegration of social networks and family ties, and the loss of jobs, should be included as elements that define victim status. The notion of social suffering<sup>16</sup> proposed by Kleinman, Das and Lock (1997) captures this sense of disaster victims. The authors argue against the fragmentation and separation of the causes of suffering into separate and isolated dimensions, classified into distinct areas of knowledge, such as those related to health, biology, economics, the social and politics. They use the term *interfuse* to emphasize the absence of boundaries between these different areas of interpreting the causal relations involved in pain (1997: xi). In order to encompass this broader perception of victimhood, members of the Association categorize the people affected by the Goiânia disaster into ‘direct victims’ and ‘indirect victims.’ The first group corresponds to the same definition of *radioacidentados* (radiation victims) used by the nuclear experts. The second group refers to the group of people who did not have direct contact with the radioactive source but who were nonetheless neighbors of the contamination hot spots.

The Association’s first board of directors, active until 1989, reflected this wider understanding of victim through its composition and through the agenda pursued over the period. The documents setting out its claims, jointly signed with the Abadia Residents Association, emphasized that the issue of the victim-disaster relationship needed to be included in a broader perspective. These wider concerns included the safety of the radioactive waste storage site and its social impact on the population of Abadia de Goiás where the site is located.<sup>17</sup> The actions pursued by the association advocated the interests of both direct and indirect victims. For example, the campaign for state pensions, compensation for material loss and better healthcare supported the direct victims, while the campaign for exemption from property tax (IPTU) for properties located within the radioactive contamination area supported both groups.

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16 “Social suffering results from what political, economic, and institutional power does to people and, reciprocally, from how these forms of power themselves influence responses to social problems. Included under the category of social suffering are conditions that usually divided among separate fields, conditions that simultaneously involve health, welfare, legal, moral, and religious issues” (1997: ix).

17 Located 20km away from Goiânia, on the BR-060 highway.

Hence, although membership of the Cesium-137 Victims Association includes the victims classified via the parameter of radiation doses, an externally attributed identity, it is important to stress that the association emerged from the agency (Ortner 2007) of neighbors who name themselves as ‘indirect victims’ of the disaster. This group of people, aside from having a predominantly residential sociability, also identify with each other through the fact that they lived in the area surrounding the site hoardings, which symbolically marked the experience of radioactive risk in the urban landscape. In this sense, it is the lived experience of place<sup>18</sup> that testifies to the experience of radiation for these people. They equally inhabit the neighborhood, were equally excluded by the hoarding boundaries, and are equally seeking to be identified as disaster victims. In this case, a claimed rather than attributed identity.

The narratives constructed by the people living in the contaminated areas challenged the mathematical understanding and objective parameters – discussed in *Scenario One* – as the only interpretative framework available to classify victims of the disaster. In parallel to the technological equipment used to discover the physical effect of radiation on people’s bodies, the Goiânia case points to this other kind of physical materialization, perceived through lived experiences rather than being captured by dosimeters and other nuclear technologies. The ethnographic data also reveals the disdain shown by nuclear experts for the low-level doses of radiation exposure that are central to the questions raised by those living close to the hot spot areas. Although studies published during the second half of the twentieth century (Bertell 1985, Gould & Goldman 1991) have already highlighted the impact of low doses of radiation on people’s health and on cultural reproduction in post-disaster communities (Stephens 1987, 1995), this topic requires much further anthropological research. In sum, the community organizations and local knowledge explored in this radioactive technology scenario (*Scenario Two*) suggest that the study of low-level doses of radiation is a political issue involving the production of scientific knowledge as much as the legal dimension in the classification of victims.

As well as campaigning for a more inclusive categorization of disaster victims, the campaign work of the Cesium-137 Victims Association has

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18 In the case under analysis, a space marked by relationship networks defined by neighborhood ties and by the sociability constructed in the search to be categorized as ‘indirect victims’ of the disaster, defined by the proximity of their residences to the site hoardings.

focused on two other issues over the years: the economic survival of the *radio-acidentados* who have been stigmatized by being considered contaminated and thus not fully incorporated into society; and the provision of adequate health care. Although legal responses had been given to these requests through the creation of special laws guaranteeing pensions and medical care, concretized with the establishment of the Leide das Neves Ferreira Foundation, a research and medical treatment center, the *radioacidentados* claim they still live in dire conditions. In 2014, 27 years after the disaster became known, the Cesium-137 Victims Association used local newspapers and social media to denounce a shortage of medications at the public health center and the discontinuation of the service for monitoring victims' health. The association members also demanded a readjustment to the value of their pensions in line with inflation.

This ceaseless struggle over more than two decades is another aspect of the social suffering analyzed earlier. If the red-stained wooden hoardings and the creation of the Cesium-137 Victims Association materialized the invisibility of the radiation disaster in the everyday lives of people living in a radioactively contaminated place, this continuous mobilization over the years also testifies to a kind of pain not accessed through mathematical rationality or through disciplinary expert knowledge. Simultaneously it also raises questions about the official closure of the Goiânia disaster. According to the nuclear agency CNEN, the disaster ended with the opening of the Permanent Radioactive Waste Storage Site in June 1997 (Silva 2002, 2009 a). However, the complaints and demands made by survivors in 2014 suggest an event that is still unfolding today.

### **Scenario Three**

Clothing / radiographs: memory and the worker identity at the contamination site

In the first half of 1997, ten years after the opening of the Cesium-137 capsule, the media of Goiânia published reports from military police officers who associated their otherwise inexplicable illnesses to a common cause: contact with the radiation. Their symptoms varied: a brain tumor, a forearm tumor, brain damage, a malformed child, blotches on the skin, psychological problems, emotional disorders, intense sweating on the left side of the body, sexual impotence. Their narratives indicated a common work experience:



they had all been responsible for guarding the Temporary Radioactive Waste Storage Site in Abadia de Goiás and/or areas defined by the CNEN as radiation hot spots and indicated by the site hoardings, as we saw earlier. The denunciations made in the newspapers and the despair of isolated individuals were given concrete voice through an organized movement involving the Association of Military Police Officers of the State of Goiás (*Associação dos Cabos e Soldados da Polícia Militar do Estado de Goiás: ACS*) and a number of federal congresspeople. In April 1997, the list organized by ACS included 128 names.

The narratives constructed by these police officers reveal that, when faced with illness, they go over their past experiences and try to reconstruct their career history to better understand the present. In the process of searching their professional and family memories, they come face-to-face with the distinction between nuclear and non-nuclear professionals working in the radiological emergency – and it is precisely in this distinction that they discern the causes of their health problems.

In constructing a causal link by the between work, disease and radiation, one idea recurs frequently in the police officers' reports: they were contaminated by the radiation and their sickness is proof of the fact – because they were not trained or equipped to work in an area exposed to a health-damaging radioactive element. Faced with this unknown enemy, radioactivity, the realization that precautions should have been taken and special equipment used would only emerge over time, as some of the police officers stated:

*No. We didn't receive any special recommendations. It even makes me smile thinking about it today. We didn't receive anything. There was the uniform we used, right? These boots we used whenever we stepped [emphasis] on contaminated ground.*  
(Sergeant Alexandre. Interviewed 26<sup>th</sup> March 1997)

*CNEN should have oriented the staff working there. Right? They should have provided them with protection. Instead of just using our [normal] uniform and spending 24 hours a day, working there non-stop, we should have stayed less time and been given other protective clothing. To be taken off and then discarded. Just like they did. Right? People from the... nuclear energy sector, they should have advised us. They have the know-how, they should have guided us too. So there was lack of advice. What was missing was advice. We should have been given disposable protective clothing. And spent less time exposed. Because the CNEN staff would stay there for... an hour maybe, half an hour. You know? Then they'd take their overalls off immediately and throw*



*them away. Their clothing went straight to the Waste Deposit. Our uniforms didn't. We'd use them again.*

(Sergeant Paulo. Interviewed 7<sup>th</sup> April 1997)

While nuclear industry workers are trained to use dosimeters and wear adequate overalls, masks and boots to protect themselves from radiation, police officers are trained to handle guns and dress in military-style uniforms. The different body techniques – the articulation between body, objects and traditional socio-cultural practices (Mauss 1974) – practiced during professional training remained unaltered, but the enemy was now the same for all those dealing with the disaster: radiation. The perception of the so-called 'Cesium police officers' of these two different professional bodies working in response to the same event, the radioactive disaster, today causes discomfort and anguish. They concluded that the lack of adequate protection while performing the work resulted in their contamination and later sicknesses. This fact exposes the vulnerability of this group of professional workers and increases their suffering beyond simple physical pain.

The perception of the difference between these two bodies initially involved their distinct clothing. It is the use of special overalls by the nuclear workers in the field that metaphorically condenses the dispute between the system of nuclear expertise and the military police force. Anthropological studies based on different theoretical perspectives, as well as semiotic theory itself (Barthes 1967), have highlighted the communicative and symbolic aspects of clothing, whether through the qualities of the fabrics themselves, or after their transformation into clothing. Sahlin (1976), for example, suggested that the symbolism evoked by differences in clothing – including the use of cotton, wool and silk – is equivalent to the distinction established by age, social class and gender. Analyzing the symbolic and semiotic possibilities of the fabrics people use, Weiner and Schneider (1989) argue that these also consolidate social relations and mobilize political power. Bean's analysis (1989) of Gandhi's use of khadi, a handcrafted fabric, woven at home, as an element used in the fight for India's independence is an example of how fabrics are perceived in terms of their symbolic, communicative and political aspects. Echoing the remarks by non-nuclear workers in Goiânia on the vulnerability they experienced in their exposure to radiation, the young people from French Polynesia who cleaned up French nuclear test sites also claimed that they had been contaminated by radiation due to a lack of

adequate protective clothing (Barrillot, Villierme & Hudelot 2012). In both cases, clothing embodies the meaning of being affected by the radiation, revealing vulnerability to the risk of radioactive contamination, and becomes appropriated in a political arena defined by risk.

The nuclear experts with their white, orange and brown overalls entered the imagination of those more directly linked to the disaster and Goiânia's population as a whole. While the overalls reminded people of CNEN – a target of suspicion and criticism during the decontamination phase – it was specialists equipped with these overalls who the local residents saw cleaning the streets, houses and people themselves of contamination. They were vested, therefore, with the status of an authority with ambiguous characteristics: they aroused distrust while also being perceived as those who could save the city from this unknown substance called Cesium-137. My understanding, therefore, is that the overalls are a metonymic expression of the socialities, embodiments and work identities established during the disaster. In 1997, the overalls used by nuclear workers reappeared as one of the key symbolic reference points marking the differences between professional groups acting in a disaster situation involving radioactivity.

This analysis of the representations surrounding the overalls used during the Goiânia disaster is rooted in an understanding of the moral nature of the fabric and clothing: its capacity to embody and transmit social values. The uniform used by the nuclear workers was transformed as the disaster unfolded into a political sign that imbued its users with legitimacy and authority and, simultaneously, denied other identities, as in the case of the 'Cesium police officers.' As a uniform, the overalls functioned as a symbol of safety, suitable to confronting a risk situation, and thus became reappropriated by police officers in their struggle for official recognition of their claims to be suffering from work-related diseases.

However, the narratives of the 'Cesium police officers' concerning the different clothing were discredited by the nuclear experts. Their argument of mystification was used to deny the places constructed by the former subjects from their experiences of not being given protective overalls:

*(...) there is a lot of mystification concerning the clothing used, the protective clothing. Actually these clothes don't offer any protection. (...) They weren't given the clothing because that wasn't their job, we were the ones working in a contaminated area, the police officers were responsible for controlling the area surrounding the exposure area, accessible to the public, an area with an acceptable dosage for the public, and they*

*stayed outside, they weren't subject to the same dangerous work conditions as the CNEN technicians.*

(Alfredo Trajan Filho, representative of CNEN, in an intervention during a session of the Goiás Legislative Assembly, 7<sup>th</sup> May 1997).

The fear and panic resulting from the realization of having worked in areas of high radioactive risk without suitable protection has transformed the nights of many of the 'Cesium police' into nightmares and insomnia. A feeling of uncertainty about the future invades the lives of these professionals and their families, and, tormented by the idea, they are unable to find answers to their innumerable questions concerning the effects of radiation on the body over time. Alexandre and Carlos reported to me several suicide attempts. This perception of the risk experienced in performing their work during containment of the radioactive disaster is accompanied by the feeling of having been deceived by their hierarchical superiors and by the system of nuclear expertise. This feeling is expressed in the narratives and in the bursts of tears that punctuated many of the interviews I made. For these police officers, the deception was double. First they were deceived into following the orders of commanders who should have known how to respond even in a radioactive situation, instead of simply using the threat of punishment to ensure the completion of tasks that aroused fear and distrust. Second they were deceived by the fact that the nuclear experts failed to pass on vital information on radiological security to non-nuclear workers helping to contain the radioactive emergency. Here, therefore, being deceived refers to their distrust of the behavior of the Military Police Command, subordinated to the Goiás State Government, and of the governmental institution CNEN.

The memory of these police officers concerning the emergency phase of managing the disaster is central to these claims. Colonel Arthur, responsible for the Military Office of the State of Goiás, head of security at the Governor's Palace and coordinator of Goiás's Civil Defense, whom I call the 'Ground Zero Colonel,' recalled the activities of the police. He tells that among the first actions implemented when they realized that they were dealing with a radioactive event was to gather accounts from those people directly involved in the disaster, attempting to map individuals and places that needed to be evacuated and kept under guard. According to him, it was the military police officers who were responsible for entering the areas later identified as radiation hot spots. They then took contaminated people to the Olympic Gymnasium,

where they waited for assistance from the team specialized in nuclear emergencies. These are the same officers who, from the first recognition of the disaster and before the scale of the contamination was evaluated, secured the areas delimited as the physical space of the disaster. This measure was taken to prevent houses from being looted and, at the same time, to stop people from entering these locations and being irradiated and/or contaminated.

This was the moment, which Colonel Arthur calls the zero hour response to the disaster, when some police officers – without any knowledge of radiological protection – entered the disaster scene unprotected, just like the Chernobyl ‘liquidators’<sup>19</sup> who also entered a contamination area without any prior information on the risk they were taking:

There are no more enemies. Just this colorless radiation everywhere. ‘So it’s like God. God is everywhere and is invisible.’ There are no more enemies. Likewise, is there anyone responsible? The first firefighters, the soldiers, those they call ‘the liquidators,’ they all set out unaware of where they were going, unaware of the risk they’d be taking. No one warned them, advised them or equipped them. ‘Everything is fine. Just wash your hands before eating,’ that’s what was told to people who had received doses a hundred times higher than an organism can normally bear. Who cared? Only the bosses had dosimeters, and those results were also kept secret.

(Vernet 1998:13-14)

The unanswered questions, the lack of support from the military police corps, the poor quality of the public health system, the low pay, the despair over the lack of resources to ensure personal and family medical care, and the failure to fulfil the promises made when CIPOLICE<sup>20</sup> was created: these are just some of the factors that led these police officers to break out of the confines of the police establishment and make their concerns public.

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19 This designation appears in the literature on the Chernobyl disaster and refers to the first firefighters and police officers to arrived at the scene of the disaster in order to ‘liquidate’ it. Some authors cite the figure of 800,000 ‘liquidators’ dispersed among the population affected by the radiation disseminated by the Chernobyl power plant (Lochard 1996:107; Vernet 1998).

20 CIPOLICE – *Companhia Independente de Policiamento Especial e Controle Ambiental* (Independent Company for Special Policing and Environmental Control), created by the State Governor on 19<sup>th</sup> October 1987 (Decree no. 2,846) to accommodate the military police officers deployed from their battalions to perform activities related to the radioactive disaster. According to Military Police newsletters, the creation of CIPOLICE included the awarding of a bonus of forty percent on basic pay and on any additional benefits of the respective post or military grade, as well as medical leave for any work-related accident or illness shown to have been caused the work activity (POLICIA MILITAR. BI – 002/87, of 3<sup>rd</sup> November 1987). The time of service in CIPOLICE would also be doubled for pension purposes and three vacation periods would be allowed during the year.

In 1997, the anxieties of these police officers were no longer kept secret within the hierarchical disciplinary system governed by the internal regulations of the military police.<sup>21</sup> Without any visible marks of radiation on their bodies (radiation lesions) and without any record of the radiation doses they had absorbed (a responsibility of the nuclear experts), the officers provided material proof that they belonged to the disaster by displaying their bodies and radiographic images. To give visibility to the invisibility of both their marks and their claims, they turned to the media. They showed their sick bodies in newspaper photos and television images: a head shaved for surgery to remove a malignant brain tumor, the loss of hair due to radiotherapy treatment, the blotches on their skin. They also posed to photographers holding their radiographs and the results of exams obtained during the investigations into the physiological causes of their health problems.



Image 16 – Report published in the *O Popular* newspaper, Goiânia, 23<sup>rd</sup> March 1997, p.3B

21 The internal regulations of the military police forces prohibit public demonstrations, especially when wearing uniforms.

By making this public display of their bodies, the embodied memory of the survivor (Sturken 1997: 254) emphasizes the place experienced by non-nuclear workers as one of the markers of their victim identity. The performative memory, understood as the recollection of the past conveyed and sustained by bodily practices (Connerton 1996:2), is set in opposition to the oral narratives used by the nuclear experts to discredit the suffering of the police officers. In this sense, the ritual performed by the officers at the waste repository involved and interconnected recollections and bodies, thereby exemplifying Connerton's proposal (1996:2) that embodied social memory is an essential aspect of social memory, and yet one still badly neglected by anthropological studies.

## Scenario Four

### Narratives and their audiences

*Stories make meaning*  
*(...) Each telling depends on the context, the audience,*  
*and the conventions of the medium.*  
Edward Bruner (1986)

The narratives constructed in the previous scenarios show that the subjective experiences of the people affected by the Goiânia disaster have become historical and throw into question official narratives of the event. This reinforces the argument that experiencing a disaster implies 'an' experience,<sup>22</sup> marked by a 'social effervescence' (Emile Durkheim, cited in Turner 1986: 35) in response to which we become not spectators but narrating subjects located amid the polyphony of the event. In this context, the scientific and technical knowledge deployed to narrate what happened through the language of doses and the parameters registered by dosimeters is placed in perspective with other types of knowledge generated by experience and activism. In the case of the founders of the Cesium-137 Victims Association and in the campaigns of the non-nuclear workers, the narrative process emerges as a performative expression that reappropriates elements of the disaster experience to

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22 Turner (1986:35) draws a distinction between 'experience' and 'an experience.' The former kind are "simply the passive endurance and acceptance of events." The latter kind, which "erupt from or disrupt routinized behavior" (caused, for example, by a disaster), imply an internal response to such events in the form of an organized narrative with a structured beginning and a defined audience.

compose stories about it. The process of making sense of the fragmented experience of the first moments of containing the disaster acquires coherence and intelligibility through the appropriation of words and objects from the technical-scientific field. On one hand, the assimilation of a previously unfamiliar vocabulary into everyday language: doses, radiation, risk, radiological protection, contamination, *radioacidentados* (radiation victims). On the other, the appropriation of objects introduced by the system of nuclear expertise and which marked a rupture in the day-to-day urban experience of these people: dosimeters, site hoardings, overalls, radiographs. In this way, the constitution of identities reveals the dialectic between humans and non-humans – people and artifacts – at the same as showing how they are created and acquire agency and intelligibility: through the interconnections between bodies, memories, categories and places.

If activism unites the narrative processes formulated by these social actors, two other elements particularize their narratives: the audiences and the meanings given to their suffering. For the founders of the Cesium-137 Victims Association, the suffering extends beyond biological dimensions of physical pain to include the pain caused by the rupture of social relationships, the depreciation in property values, and dietary problems. As observed earlier, this is a pain characterized as a social suffering that goes beyond the physical limits of radioactive contamination. The discursive performance that took place in the legislative domain was aimed at creating laws that would expand the category of victim and guarantee State pensions to the affected population. For these people, attributing meaning to the experience of being impacted by the disaster meant explaining to the congresspeople how their suffering went beyond the radiation doses. In these narratives, the site hoardings symbolized the ambiguities contained in the answers given by the system of expertise to the questions raised by local population: was living close to the red-stained wooden hoardings a risk factor? Faced with the negative reply of the nuclear technicians and the visual experience of the residents as they circulated daily among the containers filled with radioactive material, the hoardings are reappropriated by the “neighbors of the hot spot areas” as a sign of their exclusion: I lived there. In this sense, the objects signal the controversy and engender an opposition between the experience of place and the oral narrative produced by medical-nuclear science knowledge.

For the ‘Cesium police’ movement, the main interlocutors were the judiciary and the military authorities. They were not requesting the creation



of new laws, but claiming the right to be included under pre-existing legislation. The narratives constructed to signify their experience of working in the radioactive setting emphasized biomedical language. When the nuclear experts contested their claim that they had become sick due to the failure to give them the same overalls as the nuclear technicians, they sought proof that they had received high doses of radiation and had worked in risk areas in their work schedule records. These documents could prove their location and time of permanence in the areas classified as contaminated. In the process, the search for records of their radiation doses and the display of radiographs in a media performance reinforced and privileged biomedical language as an expression of their suffering. While, symbolically, people from both groups sought to be “the authors of themselves” (Bruner 1986:12) in the construction of their narratives, the Cesium police officers, differently to members of the Cesium-137 Victims Association, have done so by reappropriating and attributing new meanings to the artifacts produced by biomedical-nuclear technology: doses and radiographies. In this sense, the narrative looks to define a biological citizenship (Petryna 2002). The subjective experiences of the police officers thus employ the biomedical-nuclear idiom to affirm their identity as victims of the Cesium-137 radioactive disaster.

## Final considerations

Over the years, the classification of the disaster victims has been through two opposing movements. On one hand, strategies to restrict the number of people recognized as affected by the disaster and, on the other, campaigns to achieve such recognition. The resulting tensions and conflicts provoked mobilizations, wide-ranging discussions and public hearings in the Goiás Legislative Assembly, the Municipal Chamber of Goiânia and Brazil’s National Congress (Silva 2004 b), taking the dispute into the judicial sphere.

This conflict in interpretations has emerged since the very first moments of the specialists dealing with the bodies of the affected people. The narratives indicate meanings that go beyond humanitarian issues, health and radioactive decontamination. As in other situations involving critical events (Das 1996),<sup>23</sup> these disputes have involved a plot in which experiences of

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23 Events and experiences that permeate diverse institutions, transforming the daily lives of individuals and families, affecting their relationships – among others – with the community, bureaucracy, the legal system, medical knowledge and the State.



health are infused with legal, bureaucratic and political dimensions (Das 1996, Petryna 2002, Todeschini 2001).

In the case of Goiânia, CNEN and the Leide das Neves Ferreira Foundation (FUNLEIDE) initially adopted different approaches to defining the victims. In the first year after the opening of the radiotherapy capsule and release of radioactivity, FUNLEIDE classified four groups of people as disaster victims, including those living near the contamination hot spots – the self-denominated ‘indirect victims’ – and the non-nuclear professionals (Silva 1997:75-78). In contrast to the ideas prevailing in the nuclear sector, the institution argued for the importance of monitoring and studying the so-called delayed effects of radiation, which may be higher for low-level radiation doses than for high-level doses (FUNLEIDE 1988). During the 1990s, however, these principles were not accompanied by any measures for including this wider population in either social protection measures or as research subjects in an area that remains controversial in nuclear science – namely, the consequences of low-level doses of radiation on human beings.

In the early twenty-first century, the work of grassroots organizations led to a change in how people affected by the disaster are classified. Following the mobilization of police officers and workers from the former Consórcio Rodoviário Intermunicipal S. A. (CRISA), demands were made for legal recognition of the relationship between their sicknesses and the work they carried out in 1987 in areas contaminated by radiation and in the transportation of radioactive waste to Abadia de Goiás. The Goiás Public Prosecutor’s Office (PPO) recognized their claims as valid, redefining the laws guaranteeing pensions to the victims and classifying a new group of people in the category of disaster victims. As a result, in 2007 the PPO legally recognized 628 people as victims of the disaster in contrast to the 249 listed in 1987 by the nuclear experts and based on high-level doses of radiation (IAEA 1988: 2).

The right to a pension established by this new mechanism for identifying the victims does not, however, assure these people access to the public health services delivered by the medical institution responsible for treating and monitoring the *radioacidentados*. In fact, members of the Leide das Neves Ferreira Radioactive Victims Care Center, formerly FUNLEIDE, reject any relationship between the sicknesses of the workers and the radiation disaster, despite acceptance of their claims by the PPO. While this controversy might suggest a new scenario, twenty years after the 1987 radiation fallout, I would argue that this merely adds a new element to the issues discussed over the

course of this article. First, the ongoing conflict between two forms of classifying victims of the disaster: one based exclusively on the use of technological and biomedical parameters; the other, privileging the narratives of people who lived and worked at the site of the contamination back in 1987-1988. Second, the disregard for low-level doses of radiation as a research topic and in the classification of the people affected by the disaster. I would further argue that this subject remains an open issue to be explored by biomedics, social scientists and technoscientists, and requires a comparative and collaborative research project in the emerging field known in the United States academic community as Disaster Science and Technology Studies (DSTS) (Fortun & Frickel 2012: 2). The Goiânia disaster indicates that the study of low-level doses of radiation is a political issue that concerns both the production of scientific knowledge and the legal responses related to the recognition and classification of victims.

The conflict in interpretations found in the narratives of the many social actors involved in the disaster – nuclear science authorities, community groups affected by the catastrophe, non-nuclear workers, neighbors of hot spot areas, *radioacidentados*, legislators – and expressed over more than twenty years interweave with the politics of memory analyzed here. In parallel to the work of memory, the Cesium-137 disaster in Goiânia and the experiences derived from the constitution of identities through embodiments, artifacts and the construction of places all contribute to understanding the interconnections between biological and social processes in the configuration of biosocialities (Rabinow 1996: 91-111).<sup>24</sup> These experiences and narratives challenge the scientific monopoly of the so-called ‘hard sciences’ and exemplify the formulations proposed by Beck (1993), Palmlund (1992) and Douglas & Wildavsky (1983) concerning the political aspects of risk perceptions, indicating the need for a processual approach. Finally, the narrative of the anthropologist, a native to these scenarios, also adds her own subjective experience to the polyphonic composition of this disaster.

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24 Based on his study on the Human Genome, Rabinow describes the constitution of new identities and individual and group practices derived from the emergence of new scientific knowledge, such as the new genetics. “There already are, for example, neurofibromatosis groups whose members meet to share their experiences, lobby for their disease, educate their children, redo their home environment, and so on. That is what I mean by biosociality [...] Such groups will have medical specialists, laboratories, narratives, traditions, and a heavy panoply of pastoral keepers to help them experience, share, intervene, and “understand” their fate” (Rabinow 1996: 102).

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