Chapter Five

The making of yeast: wine micro-bio-onto-politics

Fig. 5.1: A culture of brewer's yeast in an oenology laboratory (scale 1:16).

Alessandro laughs as we struggle with pipes and pumps, preparing to decant an overheating vat of fermenting must.

"Yeast is like a human. If you give a man a bottle he'll not drink two glasses, but the whole thing and feel sick for three days after. Same thing with yeast. It eats up all the sugars, eating it produces CO_2, it warms up and feels ill, and dies. I am its friend, and I help it."

(field diary 06/10/2008)

5.1 Introduction

In the above quote, Alessandro speaks of yeast in need of help, yeast in trouble, yeast to which he is a friend. In this joking manner, he brings yeast out from the obscurity of 'things' into the ethical community of 'others' that he cares for. In this humorous recognition of yeast as an entity which must not be treated 'simply as means' but instead has to be considered 'an end in itself' (Kant 1956, quoted in Latour 1998: 231) Alessandro transforms yeast from a 'thing' into an ethical subject, from a matter-of-fact to a matter-of-concern (Latour 2004c). It is the becoming of yeast as a matter of ethical concern within goal-oriented relations of production which is the topic of this chapter.

While in the previous chapter I explored what a focus on materiality can tell us about knowledge and skill, in this chapter I take a material-centred and praxiological approach to understanding ethics as relational and emergent from and expressed through practices of organic wine production. I take the largely invisible but absolutely crucial alcohol-creating micro-organism, winemaking yeast, as my empirical focus. I demonstrate how this un-touchable micro-organism is performed into being in winemaking practices, and what the consequences of these performances are for the status of yeast as a potential subject of ethical concern.

Production practices are necessarily also ethical practices, in that in every action and decision winemakers create distinctions between what is acceptable and unacceptable, right and wrong, moral and immoral, and work to negotiate the tense space in between. Doing, Mol (2002) and Barad (2007) argue, is always both political and ethical, in that in doing we enact different ontologies of the world, and thus different possible futures. This is what Mol (2002) calls onto-politics, or 'the politics of what', a term I play with in the title of this chapter to draw attention to the lively and microbial 'politics of what' at work in making organic wine. The ethics of doing, then, has to do with choosing (in practice if not always in thought!) what kind of futures we want to enact, and how generous we are to be towards Others in sharing those futures.

In this chapter, I explore the possibility for ethical action as understood by Mol (2002) and Barad (2007): that is, ethical action which is not based on vocalising ethical principles and 'inviting' Others to share our future, but which nonetheless results, in practice, in a world (of organic wine

making) which is more generous and more polite to non-humans (Despret 2008). Thus I argue that it is not necessary for organic wine producers to explicitly recognise yeast *per se* as an object of ethical concern (the way that Alessandro jokingly did in the quote opening this chapter) for their practices to be considered of ethical import. I draw on Whatmore's (1997) relational ethics to think about the ethically significant connections organic producers forge with non-human Others. I demonstrate that the ethical dimension of working with yeast is, firstly, associated with the general importance of Nature as an ethically charged concept in organic winemaking, and the consequent ethical imperative to make spaces for nature. Secondly, I argue that the acts of making yeast ethical cannot be dissociated from the work of creating individual ethical identities (Holloway 2002). The practical relationships with yeast become inseparable from the understandings producers hold of themselves as the particular (ethical) persons they are.

To explore this practical, enacted, material dimension of the ethics of production, in this and the following chapters I focus more readily on the frequently non-vocalised dimension of ethics-as-practice than on ethics-as-discourse. Rather than questioning my research participants about what practices they consider to be morally right or wrong, or checking how (or whether) certain production practices conform to pre-existing ethical codes, I turn the question around and ask instead: when can we speak of producers having 'ethical relations' with yeast? What production practices make yeast a matter of (ethical) concern? And what consequences does this ontological shift have on the practices of production and marketisation of these wines? I argue that we can speak about ethical relations between producers and yeasts when the production methods allow yeast to emerge as a subject, not object; as a matter-of-(ethical)-concern, instead of a matter-of-fact (Latour 2004c).

In this chapter, I follow practices of working with yeast at four sites. In the first section of the chapter, I visit an oenological laboratory and a large organic winery in which the principles of oenology constitute the main method of 'dealing with' the vital materiality of yeast. [1] In the second part of the chapter, I examine how yeast's vitality is 'dealt with' at two artisan sites where oenological methods are not as dominant (although by no means absent). I argue that in employing different methods (more or less dependent on oenological understandings), producers enable or prevent the emergence of yeast as a subject (as opposed to object), and thus prevent or facilitate its emergence as a subject of ethical concern. I argue that in the case of artisan producers this ontological politics has to do with a recognition (often non-vocalised and implicit) that 'things': vines, yeasts, and wines, have a 'nature' (a *telos*), that is an essence of being which expresses itself through particular material and temporal transformations of growth, life and death, and which should not be tampered with. [2] I argue that yeast is performed as a subject, a being with a *telos* independent of human intentionality, when it is protected from the de-subjectifying and objectifying force of abstract instrumentalism (Ridder 2007) through practices of caring-for, caring-about, and, most radically, withdrawal. I argue that these practices which *make space for the*

[1] Oenology is the science of wine making; please see below for a more detailed examination.

[2] I use *telos* after Aristotle, meaning the fundamental nature of a thing/entity.

nature of yeast are in effect subjectifying, that is subject-making (Holloway 2007) practices, and thus ethical practices. I argue that it is in moments of withdrawal, of refusing to kill yeast even when its activity may result in economically negative outcomes, that organic wine producers recognise yeast as an entity with its own *telos*, and thus give it an ethical value as 'an end in itself'.

The importance of Nature as an ethical concept, and the resulting pull towards the creation of spaces for nature in production practices starts to emerge in this chapter as a powerful mode of ordering in practices of making organic wine. This chapter begins the exploration of this ethical landscape of organic wine production by focusing on brewers' yeast as a (potential) ethical subject in organic winemaking, and a significant actor in the wine's coming-into-being. A close study of working relationships with yeast in oenological laboratories, scientific discourses, and large and artisan wineries illustrates the diversity of potentials, threats and challenges yeast offers to winemakers. Opening the discussion which continues through the following two chapters, I ask questions about the material consequences of making space for nature. In the following chapters, I suggest some ways in which the uncertainty and liveliness of wines, which results from making space for nature in wine production, is then managed in the context of wine markets, which can enact a different form of ordering, that of pacification.

5.1.1 Towards 'humanist post-humanist' ethics

When speaking of ethics of the non-human domain, authors typically adopt the 'ethics of extension' approach, in which various non-humans are 'invited' into the ethical community on the basis of common denominators (such as shared suffering). The focus on ethics as practice I adopt in this thesis requires a move away from the more traditional understandings of ethics as either descriptive, normative or meta-ethics (Proctor 1998), and as emanating from and only applicable to autonomous self-reflexive individuals. The focus on ethics as practice requires us to think about ethics as relational (Whatmore 1997), taking account 'of the heterogeneous networks of human and nonhuman (including nonliving) things which are associated with the emergence of particular sets of relations which are always, if implicitly, ethical' (Holloway 2002: 2055). In this understanding, microbes do not have to be 'invited', that is explicitly recognised as ethical, in order to join the community of Others we care for. Instead, I suggest that the relational ethics is performed in practice, and that yeast, for instance, is made ethical when producers seek to 'make space for nature' (Hinchliffe 2007) in their production processes. Making space for nature can mean *making space for the nature of yeast*, that is allowing it to develop in accordance to what is seen as its *telos*, and protecting it from human interventions motivated by abstract instrumentalism (Ridder 2007). I argue that it is in the moment of withdrawal of intervention that the ethical subjectivity of yeast as 'an end in itself' is fully established.

Thus in this chapter, I move beyond ethics of extension, and I suggest that rather than being 'enrolled' into the 'ethical community' from the outside, yeast's ethical status is constructed 'from the inside', as an effect of production practices in which yeast is cared-for, and cared-about. At the same time, I recognise that awareness of abstract instrumentalism and *telos* violation is an unavoidably anthropocentric process (Ridder 2007: 201). Thus what I propose in this chapter is

alike to Murdoch's (2001, 2004) 'humanist posthumanism', which requires attention to the heterogeneous character of action, but recognises human exceptionalism (sic) within those heterogeneous assemblages, particularly the very human sense of responsibility towards Others. [3]

The act of making space for nature brings in the importance of transcendental concepts to the performance of ethics. While focusing on the human-nonhuman relations as 'ethical moments' (as per Levinas), I also acknowledge the importance of the transcendental concept of Nature to the ethical practices of production. Bringing together particular 'natures' and practices which enact them through Barad's (2007) notion of intra-action, I examine how particular spaces and materials are made ethical in practices of caring-for and caring-about. I also follow Holloway's (2002) understanding of ethical identities as constructed in relations with human and non-human others, and consider the importance of particular materials and practices to the ethical identities of producers. In the chapters which follow, I ask about the consequences of particular material-ethical (onto-political) choices for the production and sales of organic wines.

Although we need to remember that the practices of caring-for and caring-about are firmly situated within goal-oriented (i.e. instrumental) human-nonhuman relations of production, and that it is 'wild' yeast's utility, not its 'well-being', which is the object here, I argue that the goal-orientedness of the encounter does not necessarily diminish its ethical potential. Instead, I argue for the valorisation of these encounters as enriching to both human and nonhuman life, the way they are recognised by my research participants. [4] This connects with the importance of ethical human-nonhuman relations to the construction of ethical identities (Holloway 2002) of winemakers. I follow Whatmore (1997) in arguing for the recognition of a relational ethical self which is utterly dependent on attachments to human and non-human others, attachments 'whose moral force consists partly in the fact that living by them is inseparable from understanding ourselves as the particular persons we are' (Friendman 1989, quoted in Whatmore 1997: 42).

While I focus on the human-yeast entanglements in this chapter, I suggest that the practices of care and withdrawal I identify as crucial stages for the incorporation of yeast into the ethical community are the bare bones of ethical engagement with any living materiality. The importance of care and withdrawal in the marketisation of lively wines will be further discussed in the following chapters.

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[3] In this chapter I engage with post-humanist and animal studies literature, and focus on the ethics of being with non-human rather than human Others. I fully acknowledge that there are multiple ethics at work in making organic wine, and that the practices of control which characterise the more oenologically-informed organic wine making can indeed be seen as ethical practices in their own right as they too perform a kind of normativity (see e.g. Clarke et al. (2008) on the 'ordinary ethics' of organic foods which focus on health and taste, and Jackson et al. (2009) on moral economies of food). However, because those ethics remain firmly lodged in the human domain, they are not explicitly discussed in this chapter.

[4] See for example Bingham (2006) on insects and bacteria, Despret (2005) on sheep, Haraway (2008) on dogs, Hinchliffe et al. (2005) on voles, and Paxson (2008) on artisan cheese for other examples of such mutually enriching engagements.

This chapter can also be seen as a critique of the widespread assumption about alternative production spaces in which producers respond to and build on pre-existing ethical codes of conduct. I argue instead for an emergent ethics of production, in which the search for self-reflexive, post-factum rationalisations of ethics is superseded by a focus on the ontological politics of production and the agential cuts (Barad 2007) of enacting what matters. I suggest that ethics can be understood as a double circulation of human and nonhuman entities that create ethical relations, and ethical relations that create human and nonhuman entities (to paraphrase Latour and Serres 1995, quoted in Bingham 2006: 487). This is an understanding of ethics-in-becoming, ethics as a site of tension and struggle, as always present, and always in transformation.

I begin my yeast stories by introducing yeast as an object of scientific inquiry, and exploring its transformation from 'matter of fact' to 'matter of concern' (Latour 2004c) in scientific discourses. I then draw on an interview with an oenological researcher to discuss how yeast is practiced as a dangerous material in the discourse of modern oenology. I then examine the more conventional practices of controlled fermentation at a large organic winery. I suggest the modernist paradigm of these practices prevents yeast from emerging as an ethical subject. These practices are contrasted with the subjectification (that is, making subject, as per Holloway 2007) of yeast through production practices at two artisan wineries, explored in the second half of this chapter. I argue that through the practices of care and withdrawal the artisan producers re-write the dynamics of usual producer-yeast relations. I consider the importance of the concept 'Nature' as a source of ethical meaning informing production practice. I close the chapter with some thoughts on the importance of 'wild' yeast to the ethical identities of those producers.

5.2 Contested history and contested present of human-yeast relations. Domesticated yeast in scientific debates.

'Yeast' is far from one – when a winemaker talks about yeast, what are they talking about? The dry-packed stuff that flew over from Australia? The invisible, unpredictable organisms on the skins of the grapes? The bubbling in the vat? Yeast is multiple by 'fact': wild yeast is not the same strain as manufactured yeast, which is not the same as the yeast that has been living for generations on the walls of the cantina, which is not the same as the yeast developed and kept in a laboratory at the University of Padova and transported to a winery at every harvest. But, following Mol (2002) I argue that yeast is also multiple 'by performance', which is to say that yeast, understood as a series of effects rather than a reality 'out there', is enacted differently in different contexts (Mol 2002).

I what follows I introduce yeast as a matter of scientific inquiry. With science as our 'certified way of knowing' (Pickering 2008), scientific understandings of yeast become particularly important as they in turn inform localised understandings of yeast in embodied relations 'on the ground'. Employing both social scientific theories and data from natural scientists, I show how yeast disrupts anthropo-centred narratives of its emergence, and I showcase the alternative reading of human-yeast history as a tale of co-emergence in tangled webs of co-domestication. In other words, I encourage the reader to stop and pause on the importance of yeast to human nature understood as an inter-species achievement (Tsing 2004).

In the first section, I observe a change in how the 'habits' (Latour 2004) of yeast have been conceptualised in the scientific community.[5] In the second section, I draw on an interview with an oenology researcher who specialises in yeast to consider how the 'liveliness' of yeast is conceptualised in terms of danger, resistance, and aberrance.

5.2.1 Entangled species

> *'To 'de-passion' knowledge does not give us a more objective world, it just gives us a world 'without us'; and therefore, without 'them' – lines are traced so fast. And as long as this world appears as a world 'we don't care for', it also becomes an impoverished world, a world of minds without bodies, of bodies without minds, bodies without hearts, expectations, interests, a world of enthusiastic automata observing strange and mute creatures; in other words, a poorly articulated (and poorly articulating) world.'*
>
> *(Despret 2004: 131)*

Yeast is surely a human achievement. Just look at its Latin name – *Saccharomyces cervisae*, which means 'beer sugar mould', or at its common name – brewer's yeast. The assumption that yeast does not exist outside its relationship with the alcohol-making human is hinted at. I do say alcohol-making rather than bread-leavening. Just consider how many nations are happy with their flat-breads, as long as they can wash them down with a gulp of alcohol. Our millennia-long relationship with the *Saccharomyces cerevisiae* species has been extremely productive. 'At home' the effects of yeast have been utilised to support human life as bread grew, beer brewed and wine fermented. On the other hand, in the realm of science yeast has been dissected and studied intensely in laboratory environments to provide scientific knowledge: yeast has been the favourite subject for the study of genetics since the 1950s, making it one of the most intensely studied organisms in modern biology. [6] In all these engagements, the presence of yeast as a part of our species' micro-flora has been taken for granted, and it is not until very recently that we started to ask – where does yeast come from? What is yeast when neither in the wine vat nor under the microscope? What is yeast like 'in the wild'? And how did the productive cultural entanglements of humans and yeasts become possible? What is our mixed natural-cultural-social history (Hird 2009)?

To a large degree, 'the problem of the other is the problem of *knowing* the other' (Wolfe 2003, quoted in Hird 2009: 141). In the light of this, consider the fact that to this day nothing is known about the reproductive life-cycle of yeasts outside lab conditions (Replansky et al. 2008). Until

[5] For Latour 'matters of concern' are characterised by 'habits' rather than 'essences' to stress the contestability and instability of these characteristics. In the context of yeast 'in the wild' the notion of 'habit' is especially fitting, as so little is known about its procreation, spread, mode of travel, or any other activity characteristic of a yeast as a lively being.

[6] Most of the research has been undertaken on a single, endlessly cloned strain of brewer's yeast, Saccharomyces cerevisiae, called S288c. S288c was the first eukaryote to have its genome completely sequenced (Greig 2007), and become a model research organism.

recently it was generally assumed that yeast was a human-dependent species, its evolution and survival reliant on bread-making and alcohol-brewing activities of human beings. Most strains of *S. cerevisiae* yeast found 'in the wild' were considered to be 'escapees' from bakeries and breweries, without a 'life of their own' (Fay and Benavides 2005). In other words, *S. cerevisiae* was understood to be yet another domesticated species, the qualities of which have emerged over millennia-long selection processes as humans provided an environment which resulted in a development of the most desirable yeast characteristics.

To a certain extent, this 'domestication' theory has been given support in recent research which looked outside laboratories to study yeasts in their 'natural environments'. In one such project Fay and Benavides (2005) collected yeast strains in sites both connected with, and unrelated to alcohol production. Their DNA analysis confirmed that while the species (*S. cerevisiae*) as a whole was not domesticated, some strains could only be found at sites connected with alcohol-making. Domestication, as Lien and Law (2011) note, is a purely anthropocentric concept. To prove that an organism has been domesticated (like wheat) rather than just utilised (like whales) requires evidence that it has acquired characteristics advantageous to humans through human activity, whether intentional or not (Fay and Benavides 2005: 0070). One such proof of an entanglement and dependence so deep that it becomes encoded in the creature's very DNA could be the resistance to sulphites found in domesticated strains of yeast, and absent in 'wild' strains (reviewed in Sicard and Legras 2011). But the entanglement goes much deeper than that. Yeast cannot travel by air, but only on a carrier, and the main agent of biogeographical spread of yeast has been found to be no other than the alcohol-making human population. The evolution and spread of certain strains of yeast has been found to be intimately linked to human mobility and activity. In the case of wine yeasts, 95% of strains isolated around the world belong to the same cluster, suggesting a unique shared place of origin of wine yeasts. This emergence, it is now suggested, was then followed by an expansion of yeast populations which mirrored exactly the geographical spread of human alcohol-making activities (reviewed in Sicard and Legras 2011). Fay and Benavides's (2005) offer some data in support of this thesis. They argue that two evolutionarily distinct yeast strains, capable of carrying out sake-fermentation and wine-fermentation respectively, are the result of the spatial division of human populations into wine- and sake-brewing ones. The spatially distinct evolution of those two strains would strongly suggest that yeast evolution is dependent on human activity. The entanglement is so deep that alcohol-producing yeast simply cannot exist without humans.

There is another body of research out there, however, which tells a story of the yeast fulfilling its own microbial destiny separately from human activity. This research upsets the assumed dependence of microbe on human, and suggests a different tale of microbial ingenuity. First of all, an abundance of independent, 'wild' yeast has been found across the globe (Fay and Benavides 2005), with the samples showing no obvious DNA relationship to strains associated with manmade fermentations. The mobility of yeast has also been found to be facilitated by a fascinating relationship between yeast and fruit-flies (Greig 2007) and bees (Goddard et al. 2010) in which the act of being eaten by the insects actually facilitates sporification. *S. cerevisiae* has been found to be present not only in vineyards, but also on the bark of various species of trees, most commonly

oak, on mushrooms, in dung, and on insects (reviewed in Replansky et al. 2008). Interestingly, outside the harvest season *S. cervisae* has not always been found in the wineries themselves (Goddard et al. 2010), begging the question of where the alcohol-making yeasts 'live' in between harvests. A new consensus is therefore emerging in the scientific community about 'natural' origins of winemaking yeast, followed by geographically-distinct domestications (Sicard and Legras 2011).

The tale becomes more fascinating as the yeast is transformed from a cooperative brewer to a toxic predator. The existence of 'killer yeasts' which create toxic environments to erase competing micro-organisms is well documented (reviewed in Replansky et al. 2008). Ethanol is a toxin as well, suggesting that the intoxicating fermentations were first developed by yeast to secure environmental advantage.

> 'Altogether these data revealed that Saccharomyces yeast species acquired their competitive advantage in rich environments such as alcoholic beverages and food by gaining the ability of producing high amounts of ethanol and tolerating it, as well as through their ability to grow in both anaerobic and aerobic conditions. *Note that these innovations occurred far before Neolithic times or any domestication process*.' (Sicard and Legras 2011: 232, my stress)

Who is dependent on whom? Does yeast need us as much as we need it? If it were not for yeast's unique capacity to engineer its own ecosystem via fermentation, we would never know the delights and dangers of alcoholic intoxication. It seems that '*humans have not truly domesticated yeasts, but that we simply harness the fortuitous side-effects of S. cervisieae's adaptation* to invade high-sugar niches and have unwittingly created novel lineages in doing so' (Goddard et al. 2010: 71, my emphasis).

What does this new research mean for the human-yeast natural-cultural-social history? The more symmetrical understanding of yeast-human development certainly upsets the taken-for-granted unequal distribution of agency typical of domestication narratives. Domestication, Cassidy (2007) notes, is not a simple story of human mastery of the natural environment, but a complex relationship which may be 'exploitative or mutual, intentional, or serendipitous' (2007: 12). Research on yeast 'in the wild' challenges the human-centric understandings of yeast development, but at the same time threatens to reproduce the usual natural-cultural dualism when the relationship between humans and yeasts clearly has so much more to offer. Were we to disappear from the face of the Earth, yeast would be one of the few microbial species which would not be indifferent to this change (Hird 2010); were we to lose yeast tomorrow, we would be seriously worried. Additionally, in a more anthropocentric vein, the realisation that our lifestyles and cultures depend on the actions of this microbe brings with it an ethical responsibility of protecting yeast, and microbial biodiversity more generally – who knows what delicious and useful toxins are awaiting a serendipitous entanglement of human and microbe to become known.

In the context of scientific inquiry, yeast is made a 'matter of concern': its realities are multiple, context-dependent and open to contestation. In the following account, I draw on my visit to an

oenological research laboratory, where yeast is encountered within the more utilitarian 'politics of what' (Mol 2002) of fermentation research. I suggest that while science can encourage controversy and question-posing, oenology (science in the service of the wine industry) imposes strict limits on what kind of questions are relevant. Its ontological politics (2002) thus render it difficult to construct futures of making organic wine which are more generous to non-human Others, as illustrated by the example of making wine at the Perlage winery in section 5.3.

5.2.2 There is a yeast for every wine: oenological understandings of yeast

Fig. 5.2: Research laboratory at the Conegliano School of Oenology.

(based on field diary 18/09/2008)

Waiting for Tiziana, a researcher specialising in yeast at the prestigious Conegliano Oenology School, to be free, I read a poster hanging on the corridor wall just outside her laboratory. The poster explained a recent research project undertaken by the laboratory team. The researchers had been collecting 'autochthonous' yeasts, that is yeasts that occur naturally on grapes in the Prosecco growing region in Veneto. The problem, Tiziana explained, was that winemakers in Veneto tended to use predominantly imported yeast starters, which could result in a certain homogenisation of taste. The research team was therefore interested in identifying particular strains of locally found yeasts, and finding those that perform well as oenological yeasts.

The team had collected grape samples in 37 areas of the Prosecco region. A sample consisted of circa 500g of grapes in a plastic bag, which were then left to ferment in the lab. A sample of the fermented must was then transferred to a growth medium, and a growth of yeast colonies was encouraged. 484 samples were taken from the growth mediums, and their DNA was analysed. 38 genetic variants of *Saccharomyces sensu stricto* were found.

This, Tiziana explained, was the first part of the project. The much more difficult part was the identification of yeast strains from those found which would do well as oenological yeasts. Not all yeasts perform well as alcoholic fermentators, she told me. In alcoholic fermentation, yeasts eat up available sugars, and produce ethanol as a by-product; this same by-product is lethal to them above certain concentrations. 'The challenge in producing good oenological yeast is having a strand which finishes all sugars before it dies', she explained.

Why do people use manufactured yeast at all, I asked, when such a variety of yeasts exist already on the grapes? 'If the grapes are of a great quality (that is they are both ripe with a high concentration of sugars and they are free of fungal and bacterial diseases), even natural yeast can ferment them', Tiziana told me. But perfect conditions are not a given. Furthermore, choosing a particular yeast strain allows the winemaker to shape their wine to a certain extent.

> 'For example, there are yeasts that are more resistant to sulphites, and they are advised in situations when you add a lot of sulphites. There are yeasts that are well known because they do not reduce the colour of red wines (…) so that the colour doesn't change, neither violet nor orange. There are yeasts that are particularly efficient in creating sparkling wines, and so on…'

All these 'yeasts' were various strains of the same main species, *Saccaromyces cervisae*. In laboratory conditions, these strains can be made to undergo a series of tests to establish their 'characteristics' – how well they deal with copper, for example, how much ethanol they produce, do they create any unpleasant smells, how quickly do they reproduce? Winemaking companies are interested in this kind of information, and will rely on laboratory tests when choosing the yeast appropriate for the kind of wine they want to make. Some people rely on natural yeasts, I mentioned. What happens then?

> 'What happens when one doesn't add yeast is that one year one can have a very good wine, better then when industrial yeasts are added, but the year after one can have a wine with high volatile acidity, or another problem. The repetition is difficult. So when people made wine at home,

> they did it this way, because if one year it's not good it's not a big deal, but people that have to sell it, to maintain a certain standard will usually inoculate. To minimise the risk.'

What is 'yeast' as understood by oenology? It is first of all a series of effects which are measurable in the context of the research laboratory – such as faster or slower ethanol production, better or worse resistance to SO_2 etc. Second, yeast is something to be collected from 'nature' and to be then 'improved' by the laboratory processes of selection, cross-breeding and propagation. As an object of inquiry in oenological studies, yeast becomes a collection of capacities. The more yeast's properties are 'mapped into knowledge' (Stengers 1997, quoted in Whatmore 2002: 118), the less the yeast itself – the yeast 'as yeast' – seems to matter. In oenological discourse and practice, speaking of yeast ethical subjectivity is simply absurd (which explains why some oenologists were quite so amused when I described the attitudes of producers using 'wild' fermentations). Neither the practice nor discourse of scientific knowledge production create a space which would allow for a subjectification of yeast; instead, they reproduce it as a 'matter of fact' (Latour 2004c), that is as an a-temporal, risk-free object to be employed and discarded at will.

5.3 Working with yeast

The emergence of yeast as a matter of ethical concern can therefore be seen as an effect of the socio-material assemblage in which it is utilised (Holloway 2007). In the following sections I present two extremes of organic winemaker-yeast relations, the more utilitarian oenological approach, and the potentially subjectifying 'wild fermentation' approach. These two approaches to the lively materiality of yeast, one performing it as a 'means to an end', the other as 'an end in itself', represent two extremes of winemaking practices, and two extreme approaches to the materiality of wine, and I recognise that there are ample shades of grey between these two ends of the spectrum. [7] The practices and materials constituting the wines these winemakers produce can be seen as an expression of the two modes of ordering, that of making space for nature, and that of pacification. These approaches are in turn related to the constraints and possibilities for marketising 'lively' wines in particular markets, and so to the expectations of particular market agents and devices with regards to wine's materiality. It is significant that the oenological approach to yeast is employed in a winery locked into a contract with a major UK supermarket chain, while the more 'subjectifying' practices are employed by producers who marketise their wines largely in direct client relationships, and who operate with much, much smaller volumes. In the following sections rather than drawing a simplistic binary and categorising producers as either (ethical, artisan) – or (unethical, 'mass producers'), I lay the groundwork for a more nuanced discussion of how winemakers operate in the space of tensions between the two extremes of 'making spaces for

[7] For example while the artisan producers discussed below may not use the classic oenological control tool sulphur dioxide at fermentation, they may use it later to stabilise the wines for bottling. Both artisan producers also cooperated with professional oenologists; however, as I discuss, they did not always follow their 'interventionist' advice.

nature' and 'pacification' and of 'I sell what I make' and 'I make what sells', two marketisation strategies which will be examined in the next two chapters.

In this section, I narrate my first 'meeting with' yeast (or rather, its assumed presence (Lien and Law 2011)) at a large organic winery where wines are fermented using industrially produced yeast. I suggest that the performance of yeast observed in the context of Perlage is typical of oenology, which enacts the logic of modern production in which the world is mapped out on an all-encompassing 'grid of intelligibility' (Foucault 1990, quoted in Clark 2007), and in which all costs and benefits of an action can be discerned – preferably in advance (Clark 2007: 50). This modern (Latour 1993) set up prevents any enactments of yeast (its ontological politics) as anything but a means to an end, making it absurd to consider yeast as an ethical subject. [8]

5.3.1 Perlage: plug-and-play

Fig. 5.3: Preparing environment for the yeast.

(based on field diary 19/09/2008)

The cantina is at its usual mid-day mess; wagons arriving, tubes spread all over the floor, monotone noise of machinery working. In the middle of this, Alberto is standing beside an ordinary plastic container, maybe 100 litres in capacity, filled with milky brown liquid. It does not look terribly inspiring. Alberto gives the liquid a stir with an ordinary wooden cooking spoon. He then pulls out a thermometer, squats beside the container, and starts measuring. I turn on my video camera. The temperature is too high: 44 C. I ask what is inside: water, and yeast feed, he tells me. Yeast feed, I think. Ah. And that would be? Sugar? Yes, sugar in the form of concentrated grape must, and also – this stuff. He

[8] In fact, the presence of yeast is so strictly limited to its activity as a fermentator that its Australian origins do not in any way impact on the wine's identity as a 'local' product.

hands me a plastic box with a cap on it, like a big vitamin pack. The illustration shows a mountain of beige capsules, and the writing proclaims : 'MicoActive. Yeast Supplement with High Biological Value'. On the floor there is a little pile of cellophane packs with a hopping kangaroo.

Fig. 5.4: Australian yeast.

Fig. 5.5: The 'recipe'.

So this is how its gets here!, I think excitedly. The packs have a helpful set of pictorial instructions on the side, and general indications on the quantities to be used on the back in French, English, Italian and Spanish. It looks just so domestic, something straight out of a kitchen cabinet. Plug and play! Alberto takes out a pocket knife and cuts into a side of one of the packs; and beige powder, like sand or sugar, spills out of the cut when he squeezes it. With sweeping motions he starts to shake it out, while Andrea 'Barba' stirs. One after another, the half-kilo packs are emptied into the swirling water.

Fig. 5.6: Adding the yeast.

Fig. 5.7: The yeast 'growing'.

When I return after half an hour, there are already signs on the container of the yeast boiling over. It's just been mixed and is back at the bottom now, deflated. Huge bubbles are visible on the frothy surface, and as I stand above it and breathe in the bread-like smell, I have a distinct impression of growth. It is growing, I see it, slowly but surely – I set my eye and the camera on one spot, and see the surface advance within a minute.

Andrea saves me from the morbid trance. 'See? They've escaped.' He connects a hose to the vat that is to be inoculated, and draws a few litres of the must, adding it to the yeast. The heavy foam collapses as he sprays the must all over. The label on the vat says: Merlot, but of course it isn't, it's just Merlot grape juice now, until this bucket of yeast starts doing its work.

The unceremonious, matter-of-factly performance of yeast was over in less than an hour. The inoculated must was added to the vat, and for a number of days nothing seemed to be happening while the yeast was multiplying with frantic speed within – or so we presumed. I did not expect that my first meeting with the most important agent in winemaking, the one actually responsible for the wine's becoming, would be so unceremonious. The seeming obviousness and matter-of-factness of what I saw, however, was a sign of the successful work of everything that had come before. It was the final outcome of a network of materials and performances which on the one hand brought the yeast into existence as something which can be stuffed into aluminium packets and shipped across the globe, and on the other hand as something that can be 'added' to wine in this matter-of-factly manner. The becoming of this network is closely linked with the role of oenology in modern winemaking.

While it was Andrea 'Barba' and Alberto mixing the yeast into the vat, they were both working under the instructions of Andrea Gallina, the company's oenologist. Andrea had been educated at Conegliano School of Oenology, and when I met him he was a member of the Association of Italian Oenologists (Associazione Enologi Enotecnici Italiani). He often sat on Denominazione di Origine Controllata tasting panels, thus playing a role in determining what the appropriate tastes are for wines produced in the region. [9] Andrea spent most of his day at the laboratory, just behind a plywood door from the winery floor, a small room full of tubes, samples and instruments. Before being employed by Perlage, Andrea Gallina had worked predominantly as an oenological researcher. While he had already made many changes to the organisation of the winery, he would still complain about its 'disorganisation', and insufficient cleanliness. The cantina has to be like this – he once said – and raised a recently washed glass. Clean, I asked? Yes, clean. And it needs a bigger lab.

Andrea's scientific and laboratory-based experience had a very strong impact on how he understood what working with yeast implied. When I spoke with Andrea about his wines it was clear that for him winemaking was principally a bio-chemical process. He was not keen on sharing his knowledge with anyone, let alone with a nosy, female ethnographer; however, he would become more talkative when I asked him to compare his way of making wine with that of the company's previous oenologist, whom I had heard being frequently criticised. For Andrea, the main difference between them was oenological education and a scientific approach to winemaking.

> 'When I see a problem, I need to know where to act to resolve it. Because, in fact, as an oenologist, you're trying to resolve various problems: this wine has too little acidity, that wine needs clarifying (…) There has to be a logic. (…) This, at least, is how we work here – in France they work differently, they'll tell you – you're crazy, I mean, they ferment a vat with a yeast, some of it remains, and they bottle it like that, you know. They have a different idea. It depends on how you want to work,

[9] I explain the important role these panels play as in the pacification of wines in Chapter Seven.

> what the place you work in is like, what kind of a product you have, what means you have in the cantina, what personnel you have working for you, all this is a part of the final quality. (…) You can't always predict everything, but you try.' (05/03/2009)

While Andrea acknowledged a multitude of winemaking 'styles', he was adamant a winery such as Perlage should work according to classical oenology principles. For Andrea, the winery and the laboratory ought to work according to the same logic of analysis, quantification and cause-effect relationships. In his management of the winery, he was constantly seeking to align it more with the laboratory, a motivation visible in his attempts to make the space of the winery more orderly and cleaner, and to make his 'personnel' (that is Andrea 'Barba' and Alberto) more disciplined. 'Distracted' workers as well as physical and financial difficulties with achieving a 'laboratorisation' (Latour 1988) of the winery were a constant source of frustration for Andrea. He complained openly that this winery failed to provide an environment in which he could carry out his practices of winemaking to the extent he deemed necessary to achieve superior quality wines.

Just like the ethics of artisan organic wine producers I discuss in the following sections, Andrea's ethics of practice could be seen in a relational vein. For him, the exclusion of yeast as an unpredictable and uncontrollable variable was part of his work of ethical identity construction (Holloway 2002) as a professional wine maker. Having 'everything under control' and producing high-end wines which 'sell themselves' using the most advanced oenological techniques and technologies were a key part of his being a professional oenologist. In his network of ethical relations (Whatmore 1997) yeast did not feature as a matter of ethical concern; reaching a wide group of customers with his wines, and having respect amongst his peers, did. His was a different ontological politics, in which non-humans were not performed as ethically significant.

I suggest that the laboratory-based education, and the oenological understanding of wine as a series of knowable though complex bio-chemical processes informed Andrea's understanding of what yeast was, what it could do, and how one went about working with it. In other words, I suggest that Andrea's habits of body and mind resulted in particular performances of yeast, performances typical of oenological understandings in which working in the material world means dealing with 'matters of fact' rather than 'matters of concern' (Law 2004c). The pacification mode of ordering was expressed much more strongly in Andrea's wine making than the mode of making space for nature (although see Chapter Six for an extreme version of making space for nature through exclusion of sulphur dioxide at this winery). In Chapter Six I argue that the 'matter of fact' treatment of yeast in oenology is intimately linked with the way wines as material entities circulate in modern wine markets. I would argue that oenology and modern wine markets are in fact co-evolving, with both following the modernist paradigm in which materiality is first of all to be tamed and managed, expressing the pacification mode of ordering. I further expand on the importance of predictability and standardisation in modern wine markets in the following two chapters.

5.3.2 Making yeast ethical

> *'Calling a place home inevitably means that we will use the nature we find in it, for there can be no escape from manipulating and working and even killing some parts of nature to make our home. But if we acknowledge the autonomy and otherness of the things and creatures around us – the autonomy our culture has taught us to label with the world 'wild' – then we will at least think carefully about the uses to which we put them, and even ask if we should use them at all.'*
>
> *(Cronon 1996: 89)*

In the previous sections I argued that in oenological practice yeast is performed as a 'matter of fact', which prevents its emergence as a subject, an entity with a *telos*, and thus as a matter of ethical concern. In this second part of the chapter, I present and discuss the practices of working with yeast as performed by two artisan organic producers, Angiolino and Walter. Both are unusual in the world of organic winemaking in their insistence on producing wines exclusively with the use of 'wild' (in Italian, significantly, 'natural') yeast to ferment their wines, as opposed to commercially-produced yeast starters like the ones discussed in the previous section. While nearly all producers in my research 'dabbled' in 'natural fermentation', only Angiolino and Walter had been using this method consistently for the fermentation of all their wines, and for a large number of vintages. Their fermentation practices were also different from those of other producers in that they refrained from using other standard oenological aids at fermentation stage: they did not add sulphur dioxide until the fermentation was over (although they did add it before bottling), and they did not use temperature-controlled vats to aid the fermentation. This meant that they had only minimal control over any negative developments in the must during fermentation. Such practices were often qualified as 'reckless' and 'extreme' by other winemakers I discussed them with. It is important to say here that those problematic 'natural' fermentations did not at all translate into more expensive wines. On the contrary, both producers struggled to then incorporate their unusual wines into wine markets. These market consequences of ethical decisions taken in the wineries are further discussed in Chapter Seven.

My aim here is not to deliver a comparison between the practices of the two producers, but rather to use their observed and narrated practices of working with yeast to discuss the heterogeneous landscape of relational ethics of artisan producer-yeast relations. Firstly, I suggest that the non-human 'others', such as yeast, are constituted as ethical in a reiterative process of material and discursive practice. Secondly, I focus on what I believe to be the two main components of an ethics of living-with the (uni- and multi-cellular) 'others' in the context of organic production: care and withdrawal. I further suggest that the ethics of production needs to be seen as both emergent from the local practices of engagement with particular non-humans, and as informed by pre-existing transcendental ethical concepts such as Nature, and that a pre-eminence of one over the other cannot be assumed.

I suggest that while the ethical Other is initially constituted through the agential cuts (or ontological politics, Mol (2002)) of caring-for (Barad 2007), the real ethical weight of certain non-human Others is expressed in the wilful withholding of intervention and a respect for the life of the Other as having intrinsic value, even within the instrumental relationship of production. In other words, it is in refusing to kill, in spite of the problems this causes them in the production (and, further, marketisation) contexts, that organic winemakers I discuss grant the microbes hitherto unheard of levels of ethical import. At the same time, I do not want to suggest that it is the yeast *per se* which is from the beginning the focus of the ethical engagements. Rather, I seek to combine ethical impacts of the encounter with Other as an ethical moment, of the non-human Others to the creation of producers' ethical identities, and of the concept of Nature as ethically changed in organic practice. I thus suggest a more complex landscape of ethical relations (Whatmore 1997).

While I agree with McCormack (2003) we should not 'limit the field of the ethical to judgements made upon the basis of already articulated codes' (490), at the same time I acknowledge the importance of such ethically-charged concepts as Nature in the context of organic winemaking. Instead of discounting Nature as an empty signifier (as per Mansfield 2003), I argue that it continues to be a source of ethical meaning: Nature can 'still do some work' (Hinchliffe 2007). More theoretically, acknowledging the role of Nature as an ethical concept I side with Murdoch (2001, 2004) who suggests a 'humanist posthumanism', that is an approach which 'situates reflexive emancipator impulses within heterogeneous matrices' (2004: 1359), and which therefore acknowledges the difference between human and non-human within these assemblages.

In the first section, I focus on Angiolino's production practices to illustrate how caring-for microbes is constituted in practices of harvesting grapes and oxygenating musts. In the following section, I draw on Walter's experiences of 'wild' fermentations to expand on the idea of 'holding back' as an act of ontological politics (Mol 2002) in which yeast is created as a matter of ethical concern, and an entity with a *telos* independent of human intentions. I further discuss the tensions created by the wilful suspension of human intentionality when Walter struggles to adjust to the temporalities of microbial others.

5.3.2.1 Angiolino

Fig. 5.8: Angiolino oxygenating Merlot must.

(based on field diary 24/09/2008)

Every morning by the time I got up he would be already coming back from working on the vats, dressed in a pair shorts and a sweater, his thin legs stained to the thighs, red like a stork's with grape must he'd been standing in. He's been oxygenating, helping the yeasts to take off, and inhibiting bacteria from starting their own acidic works.

The must harvested earlier is already in the underground cantina, bubbling away in stainless steel. Every morning, before breakfast, Angiolino opens the door to that part of the house, and sniffs the air. And unmistakeably, every morning there is a smell of rotten eggs, a sure sign the yeast are in trouble, they are fermenting 'in reduction', with too little oxygen. Every day Angiolino decants the vats a number of times, but there is still something amiss, and he worries about his fermentations. 'When you call me up in the winter', he says, 'ask me if the fermentations have finished. If they have, I will be happy. If not, we'll have to wait till next spring to see what happens!'.

After harvesting, the freshly crushed grapes are expected to start fermenting in big, open wooden vats in a small outbuilding. The space is dark, the only light coming in through the big doors, left wide open. When Angiolino climbs into the vat, the must is so thick it supports with ease his slim body; it takes some serious stomping before he starts to sink very slightly. Knees high, holding on to

> the walls and sides of the vat, he proceeds, making sure every inch of the surface has been wetted with the liquid underneath. Carbon dioxide and alcohol fumes hit my nostrils when Angiolino releases gas pockets trapped under the cap of fermenting skins. He is satisfied – this vat is on its way; I slip my hand into the must and feel how warm it is with the activity of yeasts. Angiolino steps over the edge to the next vat along, without ever touching the ground – he hopes the yeast from the previous vat, transported stuck to his legs, will do the same trick again, and the fermentation will start.
>
> Once the fermentation begins it is a constant presence in Angiolino's life. The yeast can only be 'observed' though its effects – in the vat which has already started fermenting temperature raises, gases form, the smell of alcohol can be clearly felt. The yeast must also be present in the other vats then, but something is preventing it from starting its job. Perhaps the nights are too cool, or perhaps there is too little oxygen in the must. Angiolino forces the air in, and hopes.

In the above excerpt, the living-with-yeast is already in full swing at Angiolino's winery. Yeast is never far from his thoughts, and requires constant attention. Angiolino's intervention in the fermentation processes is minimal when one considers the amount of oenological aids potentially available to him, from heated vats to yeast feeds. In both practice and discourse, Angiolino makes a very clear distinction between what constitutes an unwelcome intervention (heating the vat, adding yeast feed), and what falls within the remit of care or, as he puts it, 'assisting nature' (oxygenating the must, decanting the vats). In creating the practical, material distinction between types of processes, Angiolino is involved in a creation of yeast subjectivity (Holloway 2007), that is an interpretation of yeast's intrinsic 'nature'. His understanding of the yeast's *telos* in turn informs which human interventions can be aligned with what he interprets as 'natural' needs and behaviours of 'wild' yeast, and which interventions are, on the contrary, disruptive of 'wild' yeasts' naturalness.

The care for yeast starts well before we arrive at fermenting (or not fermenting) vats. The first move Angiolino performs in the creation of yeast as a matter of concern (Latour 2004) is becoming interested. In taking an active interest in yeast as an important co-producer of his wines, Angiolino performs the first de-centring necessary for a recognition of the 'other' as of ethical import. Since 2008 Angiolino has been using the help of a specialist oenological laboratory to better understand the ecology of his must, the different strains of yeast found, and their needs in terms of the biochemical composition of the must. [10] Gaining knowledge about the yeasts indigenous to his musts, Angiolino then transforms his practices in the vineyards. Through such work as vine fertilisation, disease prevention, and vine pruning, Angiolino hopes to create grapes, and,

[10] Angiolino's cooperation with oenologists and oenological laboratories indicates the importance of scientific understandings of yeast to his 'alternative' practices of production. His example shows that the usual binary scientific=industrial/traditional=artisan is reductive.

consequently, a grape must which will offer an ideal environment for the local 'wild' yeast to flourish in.

> Angiolino: 'As far as I know now, you ought to have a great balance in the must, I mean a good phenolic maturation, a lot of readily available nitrogen, and have a high level of B group proteins. This way the fermentation can start, and the yeast will be continuously fed. The fermentation should start at a temperature where it's easier for the yeast, but more difficult for the bacteria, and this is under 18C. (...) The bacteria want a higher temperature, while yeast will do fine under 18 as well. So, to repeat, vinify healthy grapes, so that there is no vinegar already in the grapes; vinify at a rather low temperature, which will mean that if for example you have harvested in the afternoon when it's 22-25C you must not vinify, but wait (…) normally the nights in September-October are around 10C, so the temperature of the grapes will definitely fall to 15C, vinify then (…). Your work is not finished then, you have to make sure that the vat is full, that there isn't too much air – air favours bacteria.' (26/06/09)

In the above excerpt, Angiolino brings in practices from the vineyard – allowing the grapes to mature fully, providing vines with plenty of nitrogen during the year – and from the cellar – musting the grapes when they had a chance to cool, oxygenating the must – into a holistic picture of the practice of care. Throughout the year, yeast exercises its influence on the work done in the vineyards. The needs of yeast are explicitly valorised as practices of vine care are re-shaped and re-configured to provide for (some of) the needs of the absent yeast. In contrast with instrumental encounters at Perlage and the laboratory where the activity of yeast was mainly conceptualized in terms of aberrance and resistance, in Angiolino's practices yeast is 'made to matter' in a more complex way. By recognising (some of) its needs, Angiolino creates a space of ethical engagement with yeast in which his intentionality as a producer is de-centred though a concern for the 'welfare' of the microbe. It is through this act of de-centring that Angiolino makes yeast a matter of ethical relations.

The care-for is, of course, goal-oriented. The relationship with 'wild' yeast is ultimately instrumental. The reasons behind Angiolino's interest in the yeast, and his practices of caring, are directly linked with his desire for quick, successful fermentations, instead of the slow, problematic ones he has been experiencing in recent vintages. However, it is his refusal to interfere in fermentations even when the 'wild' yeast 'lets him down', when the conditions are not 'naturally' right for its development, that Angiolino clearly designates 'wild' yeast as an ethical entity, with a integrity that must not be breached through the use of temperature or chemicals, even if it should lead to wine turning to vinegar.

> Angiolino: 'Every year there is something, we always have something we throw away, that has to be thrown away. That did not go well because,

> perhaps, there was oxidation, or volatile acidity, volatile acidity is a beast... Not working with chemicals, what happens – during the fermentation, as I said before, if the temperature is wrong, if the maturation [of the grape] is wrong, if there are mouldy grapes [then] the bacteria start first, and they produce vinegar, and then yeast, which produce alcohol but cannot win with the bacteria. (...) It's not like during the night I go and add sulphur; it's like this, it ought to ferment by itself.' (21/09/08)

Withholding intervention can lead to an entire vat of wine being spoiled, and the labour of both Angiolino and his vines and yeasts to be wasted. The vat 'ought to ferment by itself' Angiolino claims, interpreting harmonious fermentation as a sign of yeast's 'nature', its essence, its *telos*. In conventional oenology, the failed fermentation would be 'blamed' on the weakness of 'wild' yeast, and it would be quickly replaced by another, stronger strain. The utilisation of yeast would be an exercise of the abstract instrumentalism typical of goal-oriented human action (Ridder 2007). For Angiolino, the failed fermentation is not a sign of the yeast's failure, but instead a sign of his failure as a winemaker. His duty, as he sees it, is to prepare a habitat (wine must) in which the yeast can flourish, and in which it can carry out a harmonious fermentation. 'It ought to ferment by itself' means that it is the yeasts' natural destiny to ferment, and by failing to provide the right habitat for it to do so Angiolino is failing to nurture this 'natural' pathway. Accepting this failure, and not interfering with chemical aids, means losing money. And it is in this radical act of de-centring his agency as a producer of wine through the refusal to add sulphur dioxide, and as a result allowing the wine to spoil, that Angiolino makes 'wild' yeast into an ethical subject. The ultimate recognition of the ethical subjectivity of the non-human other is performed in the act of making the Other less killable (Haraway 2008).

In his learning about yeast, Angiolino creates an opening in which unexpected, creative, and disruptive things can happen. Through his practices of caring-for in the vineyard and in the winery Angiolino makes himself available to the yeast, allows the yeast a degree of authority to choose what is necessary for its growth, and makes possible a more generous meeting-with (Hird 2009). However it is in suffering financial loss by letting wine spoil through a refusal to interfere in the 'natural' trajectory of yeast's activity, through the caring-about yeast *as* yeast, that Angiolino ultimately creates yeast as a matter of ethics, an end in itself. I expand on this idea of withdrawal as the ethical moment *par excellance* in the following section, in which I examine the version of working-with 'wild' yeast at Terra d'Arcoiris.

5.3.2.2 Walter

Like Angiolino, Walter was a late comer to winemaking. After he and his wife Paola acquired land in Toscana they found themselves with a vineyard and an orchard in need of tending. Managing their land using biodynamic methods was an obvious choice, as 'who became interested in agriculture as a choice of a lifestyle rather than as a necessity anyway was anyway interested in organic agriculture, but biodynamic agriculture at that stage was the only structured one [available]' (Paola

05/11/2008). [11] For a number of years they sold their grapes to a local wine cooperative; in the meantime, Walter began making small quantities of wine himself, out of curiosity. The interest grew, and in 1995 they produced their first complete vintage. Since 2005 Walter has been vinifying all his wines using indigenous yeast, which can lead to unpredictable vintages.

In the following excerpt from my field notes (25/02/2009), I illustrate how, through a radical withdrawal from interference into the workings of his 'wild' yeast, Walter in effect constructs yeast as an ethical entity, that is an Other worthy of protection from relations based on abstract instrumentalism (Ridder 2007).

> At Terra D'Arcoiris, a never-ending fermentation is still under way. Their 2007 vintage had quite a bit of trouble starting the fermentation, and when the winter cool came, it stopped completely. Stopped fermentations are not that uncommon among the supporters of natural fermentations, and not all was lost, as the temperature-stunned yeast usually re-awakens with the spring, and finishes the sugars as if nothing had happened. This wine, however, was different: the vat did indeed re-start in the spring, but then it kept bubbling gently throughout the summer and by the next *vendemmia*, in 2008, it was still not showing any signs of finishing. Following the advice of his oenologist, Walter decided to interfere and mixed 50 litres of the 2007 wine with a starter of 'wild' yeast (fermenting must) from the 2008 batch. The fermentation became more vigorous, and so he added another 200 litres of 2007 two days later. He kept gradually adding the 2008 vintage until half of the whole 2007 supply was fermenting, and then he mixed both batches together. When I was speaking with Walter, six months after the re-inoculation, one of the resulting vats had finished the fermentation, but two more were still rumbling in the cantina.
>
> > Walter: 'It's the first time this has happened. I have to say, when the wines don't finish, you are always a bit worried, because they are still at risk; because anyway they are already a year old, and they still have yeast, right – so on the one hand they already taste of mature wine, but on the other there is a taste of yeast. (…) [I]f your wines have finished fermenting by November, you are at peace (...) However, if there are still sugars, there is always the risk the volatile acidity will grow, you're always there within shooting range, without ever being able to relax.'

[11] Biodynamic and organic vitivinicultural methods share a concern with maintenance of the naturalness of the soil through a ban on herbicides and pesticides (with some exception), and there are many overlaps between the two approaches. Typically biodynamic producers additionally organise activities according to the lunar and stellar calendars, and use homeopathic sprays for the fertilisation and protection of vines.

Like Angiolino, Walter performs a difference between interventions which can still be considered 'natural' (adding a starter of indigenous 'wild' yeast to the problematic vat) and those which are not (adding industrially-produced yeast, heating the vat). Naturalness, Ridder (2007) notes, is not absolute, but judged on a scale, and it diminishes with increasing abstract instrumentalism. In these practices, we can see how Walter seeks to maintain the 'naturalness' of the wine through avoiding adding more abstract instrumentalism (we are already in a profoundly 'impure' situation). Importantly, in the process he creates yeast as a matter of ethical concern, with an inherent 'nature' (*telos*) which in itself is a source of value, and which must not be interfered with.

His performance of yeast removes him as a wine-maker from the position of power in this instrumental relationship with yeast in a radical way. A 'less natural' interference through adding manufactured yeast would lead to a quicker termination of the fermentation (the fact that the yeast is manufactured designates it for Walter as less natural than 'wild' yeast, in accordance with Ridder's (2007) thesis that abstract instrumentalism diminishes naturalness). [12] In spite of that, Walter restricts himself to adding more 'wild' yeast and thus not interfering in a more instrumental manner with the yeasts' proceedings even when it leaves him in a situation of uncertainty. This openness and generosity to the 'other' have a price: Walter cannot foretell how this never-ending fermentation is going to finish. What will be the final taste? How much sugar will there be left? The risk of yeast failing to process all the available sugars is a serious problem for Walter. The 2007 is a hard, heavy red wine, and it needs to spend at least three years maturing in barrels to weaken the tannins for it to be drinkable. However, as long as there are sugars present, the wine can be easily infected by sugar-eating bacteria or the 'nasty' yeast, brettanomyces, which produces unpleasant smells. The sugar levels have to be very low, and the fermenting yeast has to finish its work before this wine can progress, and before Walter can be at peace, before he will know if this wine will ever realise its monetary value.

Both Walter and Angiolino can be seen as withholding their interests as economic actors by accepting monetary loses, or living in a situation of uncertainty as to the final value of the product, in order to maintain the naturalness of the fermentation process. The naturalness of the process is preserved as long as it is not subject to the abstract instrumentalisation (Ridder 2007) of the economic production narrative. The ultimate objective – bottles of sellable wine – is de-centred in order to maintain the naturalness of the fermentation processes occurring in the vats, even if this should, ironically, lead to the 'untimely' death of yeast and a 'victory' of acidic bacteria, and wine spoilage. I argue that it is the process of preserving the naturalness of wine which results in the creation of yeast as an ethical subject. The ethical status of yeast emerges from within this relation.

Angiolino and Walter represent an extreme position in terms of their engagements with yeast, and as a result in their practices the subjectivity of yeast as a significant Other emerges most clearly.

[12] Adding a strain of manufactured yeast would ensure a quick completion of the fermentation. Manufactured yeast strains are selected to reproduce quickly, dominate 'wild' strains and efficiently process available sugars.

However, as I argue in the conclusion to this thesis, preserving naturalness (creating spaces for nature) in the form of *telos* of the entities we engage with in food production processes is not restricted to organic winemaking. As I discuss in Chapter Seven, the methods of wine marketisation these two producers depend on, which are primarily face-to-face sales relations, make it possible for Angiolino and Walter to continue their unusual and risky winemaking practices. All organic producers are caught in the space of tensions between the exigencies of marketisation, and the 'pull' of their ethical identities as organic producers, the two modes of ordering their practice. This space of tensions, and the different methods for managing it amongst producers whose relationships with yeast are less 'extreme' are discussed in the following chapter.

5.3.3 Naturalness and ethical identities

For the two artisan producers, and the oenologist discussed earlier, performing yeast through particular practices and relations can be seen as part of their ethical identities as wine makers. For Walter and Angiolino, creating spaces for nature through a preservation of the *telos* of yeast formed a part of who they were. For Andrea, preventing this emergence by keeping control over processes of vinification through his knowledge as an oenologist similarly formed part of who he was. In the following section, I suggest that the practices which allow yeast to emerge as a matter of ethical concern in the case of the two artisan producers discussed need to be seen in relation with other practices in their wineries and their vineyards aimed at the construction/preservation of 'naturalness'. [13] While fully acknowledging the importance of embodied relations for the emergence of ethical relations, the situatedness of ethical agency and the extralinguistic connectivities of the ethical community (Whatmore 1997), I also argue that the importance of meta-discourses such as Nature as sources of material meaning in production must be taken into consideration. I believe it is necessary to acknowledge the 'human exceptionalism' (*sic* Murdoch 2001) in heterogeneous ethical networks, that is the human self-reflexivity which allows for a wilful de-centring and leads to notions of responsibility and care. I agree with Murdoch (2004) that while humans are enmeshed in complex sets of heterogeneous relations, they remain capable of distinct and definitive actions, often by following transcending concepts such as "nature, justice, humanity" (1358).

In this section, I do not focus purely on the vocalised and self-reflexive positioning of the producers. The search for self-reflexive, post-factum rationalisations of ethics which rely on the reference to codified ethical registers is superseded by a focus on the ontological politics of production and the agential cuts enacted in choosing which materialities matter.

[13] Similarly, the practices which prevent the emergence of yeast as a matter of ethical concern in Andrea's winery are consistent with his other practices aimed at a close control of all variables. These are not further discussed in this chapter as they preclude ethical relations with yeast. Nonetheless, they too can be seen as ethically normative, for example as an expression of the market order of worth (convention) (Boltanski and Thévenot 1991).

5.3.3.1 Making spaces for nature

It is important to recognise that in explaining their production practices, and the onto-political choices these imply, neither Walter nor Angiolino referred to the codified ethics of biodynamic or organic production as ethical matrices within which they position their working practices. On the contrary, both producers had contested relationships with the certifying bodies, and with what they both saw as 'reductive' approaches to working in a 'natural way'. While Angiolino had opted out of the certification schemes altogether, Walter's wines were still being certified by Demeter. [14] His wife, however, expressed their shared scorn for the organisation when she mocked Demeter in the following way: 'it is us who makes you look prestigious, not the other way around, and it's us who certifies you, not you us' (Paola 05/11/2008). Their position interestingly challenges the assumption often reiterated in Alternative Agro Food Network studies, where producers are seen to be rationally utilising codified ethics of organic production to intentionally challenge ethically unacceptable systems of food production and provision (for example Guthman 2000). Here the relative marginalisation of codified ethical 'standards' suggests that the ethics of encounter, and the ethical meta-discourse of Nature play a much more central role in the performance and understanding of the ethics of production.

Similarly in the case of Angiolino, producing wines using 'wild' yeast fermentations can be seen as a continuation of his previous food production practices. In our early conversations, when I was still trying to pigeon-hole Angiolino's approach, he would describe himself as a 'naturalist', and a lover of foods and production methods which came as close as possible to being 'natural'.

> Angiolino: 'I have always been a naturalist. That is, before doing this job here, I worked as a pizza maker. I made pizzas. And also there [I] tried to use natural sour-dough yeast [*lievito madre*], tried to use raw materials which were as natural as possible, the mozzarella, the tomato, the prosciutto, all that, natural. I worked in a pizzeria to be able to earn money to be able to afford the luxury of buying the house, the cellar, the equipment, to do this job I'm doing now, because since I was little I dreamt of being an agriculturalist, of doing this job.' (30/07/2008)

The pursuit of 'naturalness' informed all Angiolino's vine-growing and wine-making practices. The construction of his vineyards as 'natural' was expressed in creating difference in the status of processes and materials as ethically acceptable or unacceptable. Naturalness is a relational concept (Verhoog 2003), meaning that the naturalness of spaces and processes is established in relations with other processes and spaces considered less natural. For instance, in Angiolino's opinion using industrially-produced chemical sprays would erase the 'naturalness' of a vineyard. Using organic-approved sulphur and copper mixes was also not good enough, as it introduced 'alien' heavy metals into the soil. Instead, Angiolino used herb-based sprays he made himself.

[14] Demeter is a European Biodynamic food and drink certifying body.

Similarly, instead of using industrially-produced but organic-certified fertilisers, Angiolino produced his own vegetal fertiliser which was then spread in the vineyards. His inspiration, he explained, came from the composition of the forest soil, with its abundance of micro-organisms and the healthy co-operation between micro- and macro-organisms. In his view, it was through a creation of a healthy environment in which all organisms find a full satisfaction of their 'natural' needs that he could then positively influence the behaviour of the fermenting yeasts: 'I concentrate on the soil to then have the result in the fermentation' (10/03/2009) .

Fig. 5.9: Walter in his vineyard.

Similarly, using 'wild' yeast in fermentation was consequent with the existing practices of nature creation/preservation at Walter's vineyards. As was the case with Angiolino, for Walter the naturalness of a space or process was judged by the lack of human intervention. Intervention was only acceptable as long as it was directed at a protection and encouragement of 'natural diversity' and 'natural vitality' of a place or process. When we were walking in his vineyard, Walter told me how his conception of nature, and consequently his vineyard practices had been influenced by the philosophers he had read. For him, the issue of non-intervention into the life of non-human Others was a key aspect of ethics of production.

> Walter: '(…) nature, that is all living things, have a right to exist irrespectively of humans. This is a key thing. And it's not about the biblical concept of the man's mission to dominate nature, anthropocentric. (...) If you start off thinking that you can be at the most an element of nature, but also try not to suppress, and to safeguard as big a diversity as you can in your little field of work; if you plant a vineyard it's clear that planting it in a

> forest would be too difficult, because by nature the vine would be a tree climbing plant. But you have to plant it like this, like you can see, because otherwise, economically, it doesn't, you can't do it. However, even if you plant it this way you have to try and create it a habitat, an ecosystem which is not a desert, where only it [the vine] has to live and nothing else. *You have to try to leave as much richness as possible, to create richness around it*.' (05/11/08, my emphasis)

While acknowledging that there was nothing 'natural' about winemaking, in that winemaking is a human-centred process, Walter nonetheless sought to create spaces for nature (Hinchliffe 2007) through his acts of ethical difference-making. Like Angiolino, in employing the transcendent concept of Nature, Walter in fact created specific natures, in specific places, and within specific, instrumental relations of wine production. Both in the case of Angiolino and in the case of Walter, the practices of production were influenced by reflexive ethics of engagement with 'nature' in its manifestations as, for instance, plants and microbes. 'Naturalness' emerges from their practices as a relational concept, in that things are described as 'natural' in reference to other processes which are less 'natural'. [15] The approach both winemakers took to nature corresponds with Ridder's (2007) suggestion that in establishing a 'naturalness' of processes or spaces it is not so much the *act* of interference which is judged as the *character* of it. For example, a relationship between two animal species is seen as natural, but an intentional relationship between a human and an animal species is not. This distinction, he argues, is rooted in the differentiation between humans and other beings as 'rational agents', and only ones capable of abstract instrumentalism in their engagements with the world. In Ridder's understanding, which seems to be well expressed in the practices of Angiolino and Walter, *it is abstract instrumentalism which is the anti-pole of naturalness*: naturalness of a thing or a process is defined along a continuum diminishing with an increase in abstract instrumentalism.

Creation and protection of natures emerges as a deeply ethical undertaking, both creative of ethical spaces and things, and informed by recognition of their intrinsic value which (conceptually) pre-dates the engagement. If we follow Ridder's logic, acknowledging the naturalness of certain processes or 'things' as a desirable characteristic necessitates engagements with those processes and things which are based on, firstly, provision of conditions for their flourishing (caring-for), and, secondly, a withdrawal from interventions which could be seen as fuelled by abstract instrumentalism (caring-about).

5.3.3.2 Ethical identities

Making spaces for nature which was visible in all aspects of Walter's and Angiolino's vitivinicultural practice was not, I suggest, primarily fuelled by an abstract desire to recognise yeast as an ethical

15 This seems to be in fact an understanding of nature typical of organic producers; see Verhoog (2003).

subject. Instead, I argue that yeast's subjectification was a result, or even a side-effect, of Walter's and Angiolino's work of ethical identity construction (Holloway 2002), in which creating spaces for nature, and managing 'natural' entities without the 'artifice' of modernity, is an important element. This relational ethical identity expressed itself in the practices of caring-for and caring-about yeast to preserve/construct its 'nature', and therefore represent their ethical identities as producers of 'natural wine'. The centrality of these practices to the ethical identity of the two producers is further explored in this section.

The obvious question, and the one Walter is asked repeatedly by his oenologists and his winemaking colleagues was – why do you put up with all this uncertainty? Why not make your life easier with a little SO_2 intervention? This was a question I also felt compelled to ask. It is worth here quoting at length from a conversation with Walter in which I was forced, as a researcher, to acknowledge the limits of depending on self-reflexive rationalisation to inform understanding of ethics as practice. This moment led me to side with Whatmore (1997) in recognising the importance of the relational ethical self which is utterly dependent on attachments to human and non-human others, attachments 'whose moral force consists partly in the fact that living by them is inseparable from understanding ourselves as particular persons we are' (Friendman 1989, quoted in Whatmore 1997: 42).

> Walter: 'It's in a way… (pauses for a few seconds) It's just something, something that, that nature itself suggests to you. If things can develop naturally, interfering and limiting that expression, because if you interfere with the yeast you have, a, an easier route, a more linear route, because there is a logic which says that if you add yeast they take the upper hand and bring the fermentation to a conclusion. Instead letting them start on their own you have a, a range of various yeasts and also bacteria which start working to feed off the sugars, and other things that are there. In this variety you have good and bad things, but you also have bigger complexity. (...) [If you don't want that] you can use another load of products that limit, and that direct the wine… technologically.
>
> Anna: And you (…) enjoy not knowing what exactly is going on?
>
> Walter: Tu-tum, tu-tum, tu-tum (puts his hand over his chest and makes a gesture and a sound of a heart beating heavily).
>
> Anna: (Laughs out loud)
>
> Walter: It's not exactly that I like it.
>
> Anna: Because you could make your life much easier, interfere and clarify, use gum Arabic, other stuff…
>
> Walter: Yes, and in fact the advice I get always suggests I do that…

> Anna: Advice from your oenologist.
>
> Walter: Yes, from him and other oenologists, and of many of my colleagues.
>
> Anna: And you remain stubborn instead.
>
> Walter: Well, otherwise, what would I be doing here? [a pause as I look at him inquiringly. Walter looks back and repeats very clearly]. If I did not resist these influences, what would I be doing here? Work from home? [uses a phrase implying low-level manual work performed at home, *lavorante a domicilio*] Let others decide what my product has to become? Perhaps it is an infantile resistance, I don't know. (…) Other people don't like to complicate their lives.'
>
> (25/02/2009)

Although I would have liked to press Walter further on his motivations, he seemingly became bored with the conversation, or maybe annoyed, got up to make coffee, and we drifted off-topic. This is what he does, this is what he believes is right, and my questioning did not get us any further. His sudden self-deprecation, and alluding to manual-work as the only other work option available to him, suggested to me the importance of his own creative output as a key motivation for working with yeast, the pride he took in his ability to overcome difficulties, and his interest in the work with yeast as an important element of self-worth.

In my conversations with Angiolino, he expressed a similar interest in producing with 'wild' yeast as a project of self-fulfilment. He drew a strong difference between big wine producers who relied on oenological aids, and his own winemaking processes, saying: 'I don't want to produce like them, I don't want to standardise like them. I want to remain in the lead' (26/06/2009). This 'selfish' opening to yeast as part of the project of self-construction is a far call from the abstract, rhetorical ethics of many an animal study debate. However, I would argue that this firmly anthropocentric ethics is also more realistic. Forging forever new attachments with non-humans, extending the human-nonhuman collective is, Latour suggests, what we as humans do, what is part of our usual way of engaging the world (Latour 2004b). At the same time, how we chose to engage with the world, who is allowed to speak and on what terms, is the stuff of ontological politics (Mol 2002). The more of the world we become open to, the more available we become to it, the more world there is for us to experience (Latour 2004a). In the process of enlarging our participation in the world the pitfall to be avoided is what Ridder (2007) calls abstract instrumentalism, the subjugation of others (human and nonhuman) to our own desires. It is the fear of abstract instrumentalism, of being deprived of self-worth and autonomy, and of becoming tool, Ridder argues, which fuels our need to create the category 'natural', that is, undisturbed, allowed to fulfil its own potential. I believe Ridder's observation corresponds in an important way with the ontological politics of winemaking performed by Walter and Angiolino. Their recourse to working with natural processes may echo their own desire to be recognised as creative individuals.

I suggest that both in the case of Angiolino and Walter the open-ended engagement with yeast is a space where their subjectivity as alternative producers can emerge. Their practices of caring-for and caring-about, I argue, were not motivated by abstract ethics of encounter (as in Owain 2000), but by personal ethics of self-fulfilment through interesting and dangerous entanglements. Regardless of their motivations, both winemakers created environments in which new human-microbial relationships become possible; a more interesting, if more volatile place of work and play. This was their 'politics of what', this is the kind of world they chose to perform and inhabit. In this complex ethical landscape the ethical status of microbes, local natures and producing humans emerges as inter-connected, changeable, and relational. However, as I explore in the following two chapters, these ethical choices have material consequences in terms of wine's stability, and thus its marketability. The generosity of encounter in making space for the nature of yeast is thus not limited to the winery, but necessarily extends to the consumers as 'societies of friends' of the yeast (Tamen, 2001, quoted in Bingham 2006: 487). This is serious microbiopolitics (Paxson 2008), or even micro-bio-onto-politics. And perhaps all this trouble is worth going to as 'among beings who recognise one another, who respond to the presence of a significant other, something delicious is at stake.' (Haraway 2008: 236)

5.4 Conclusions

The question of living with (living) 'things' is also always a question of ethics, an ethics of killing well and eating well, as Haraway (2008) would have it. It is also a question of onto-politics (Mol 2002), as it opens or closes possible futures, answering questions about who 'gets to be heard'. As post-humanist studies 'invite' ever larger numbers of living non-humans to the community of ethical Others, the questions about what may constitute an ethics of living and working with non-humans becomes ever more pertinent.

In this chapter, I followed Whatmore's (1997) notion of relational ethics to examine how the ethical dimension of human-nonhuman relations is established in organic winemaking. I focused on the practices of working with brewer's yeast. I argued that making yeast recognisable as a matter of ethical concern (as opposed to a matter of fact (Latour 2004c)) can be seen as a relational effect, not an exercise in human 'ethical generosity'. I argued that the two artisan producers discussed in this chapter worked to maintain the 'naturalness' of their wines by withholding from intervening in the activities of wild yeast used in fermentation in ways which could be judged as purely instrumental (Ridder 2007) (these judgements being personal and context-specific). Through practices of care and withdrawal, these producers were creating *spaces for(the) nature (of yeast)*, that is spaces in which what they saw as the *telos* of yeast could unfold 'undisturbed'. At the same time, I demonstrated that these acts of making yeast ethical were not rooted in an abstract concern about 'ethical rights of yeast'. Instead, they were inseparable from the work of constructing individual ethical identities by these producers; their ethical identities were intertwined with their practical interactions with the world.

Following Holloway's work on cows (2007), I thus argued that the way we perceive the 'nature' (*telos*) of non-humans we work with can be seen as an effect of the socio-material practices of

production. I argued that in order to create a space for ethical relationships between humans and nonhumans (for example organic wine producers and yeast) in the world of production, human intentionality must be wilfully de-centred. This need not be motivated by an ethics of extension, but can be motivated, more prosaically, in the desire to be-more by extending our networks of relations (Latour 2004a). In practices ruled purely by abstract rationality (Ridder 2007), no space remains for the nature of things, and their activity remains restricted to such interpretations (and reactions) as obstacle, failure and aberrance. Where space for nature (of things) is created, 'things' become ethical, even when this ethics is not explicitly recognised.

In contrast to Paxson (2008), I thus demonstrated that granting microbes ethical import does not have to be motivated by an inherent ethical interest in the Other. It can be motivated by more prosaic concerns over self-identity and product characteristics. The practices which result in the making space for nature, and which work towards achieving 'naturalness', variously understood, I argued, need to be read as ethical practices in which distinctions between acceptable and unacceptable behaviours (interventions) are constantly made. They also need to be seen as acts of ontological politics (Mol 2002), because in including yeast in the collective of Others for whom we have an ethical responsibility these producers were creating a particular kind of future.

However, practicing those ethical distinctions comes at a price. In making space for the 'nature' of yeast in their practices of making organic wine the two artisan producers discussed in this chapter were also influencing the material and organoleptic characteristics of their wines, and thus their marketability. [16] As I met with them for the last time, Walter was wondering about the future of his 2007 vintage, while Angiolino's 2007 lot of bottled Sassaia wine had already become spoiled by secondary fermentation. Even worse, the part of Angiolino's wine which did not have any added sulphites not only re-fermented, but also developed an unpleasant smell of dreg, and could not be sold. The decisions which result in the making of space for nature of entities involved in the making of wine can result in wines which are volatile and lively, and the characteristics of which are difficult to predict. This poses serious challenges for wine producers who, at the end of the day, have to make their living somehow. Thus managing the vitality of microbes in wine is a key element of practices directed at the pacification of wines, at making them qualculable and thus more aligned with the expectations of many market actors as to the material and taste characteristics of wine. The entity which enables this management of material vitality of wines, but which also poses challenges to the ethical identity of organic producers, the chemical sulphur dioxide, is the topic of the next chapter.

[16] Organoleptic: related to sensory perception, such as taste and smell.