

EDIT Workpackage 5 – Model 20 Detail

The taxonomist in this case works in the Zoological Institute of Russian Academy of Sciences in St. Petersburg. His work covers research into various groups of nematode worms. The taxonomist also has curatorial responsibility for the museum's collection of these groups, so assesses loan requests and develops the strategy for developing and maintaining the collection, as well as supervising post-graduate courses.

The following table describes the individual steps of the process model in detail.

| | | |
|----------|--------------------------------------|--|
| Activity | Select a sub-group to work on | The direction of the taxonomist's research is guided by a combination of personal career interest and the institutional goals of ZINRAS. This commonly means that the broad direction of research is determined by the responsibilities of the post, whereas the specific projects undertaken are at the discretion of the taxonomist himself. |
| Activity | Search Literature | Broad category representing the sourcing and gathering together of background literature pertaining to the group under study. |
| Action | Identify existing literature | Having spent years working in the field, the taxonomist is familiar with all the relevant major journals, so will tend to have a good idea where articles can be found. For a wider search of what's out there, Google is a useful resource. |
| Action | Gather existing literature | Literature tends to get collected in pdf format. Inter-library loans are possible, but can be slow to arrange, and if a charge is levied then this is not an option. The taxonomist routinely circulates pdf copies of his own publications to colleagues working in the field; this is in fact common practise. |
| Activity | Collecting activities/ Field work | <p>Because nematode worms are ubiquitous across nearly all environments found on Earth, they can be collected from almost anywhere. The taxonomist has collected in many areas of the world, though most commonly China and the East Prussian regions. Collaboration with Chinese institutes is very common from in this institute, as Chinese funding bodies tend to be generous with grants.</p> <p>Activities with European and American bodies are seen to have deteriorated over recent years, after a perception that such collaborations were becoming less fruitful for Russian institutes than in the past.</p> <p>Specimens are also acquired through contacts in customs. Confiscated biological material can be a valuable source of specimens, especially if the precise location it was found it known. Using this methods material can be gathered from all over Russia without leaving St. Petersburg.</p> |

| | | |
|----------|------------------------------------|---|
| Action | Arrange permits and practicalities | Permits are always officially required to remove biological material from a country. Funding sources are ever shifting, and will depend on the particular project. One established funding body is the Russian Foundation for Basic Research. |
| Action | Conduct collection | Perform the actual collection. In the case of nematode worms it is the substrate itself that is gathered rather than individual specimens; soil, twigs and other foliage from trees and other plant life. |
| Action | Transport specimens home | Often carried by hand if possible. The post is seen as an unreliable resource due to breakages and charges levied by customs. |
| Activity | Gather existing specimens | A broad category representing the sourcing and gathering together of the specimens cited in the revisionary literature pertaining to the group under study. |
| Action | Identify existing specimens | Existing material is identified either through citations from gathered literature, or from searching the literature pertaining to the group under study. |
| Action | Gather existing specimens | The favoured method of gathering existing specimens is by hand. In the past, sufficient samples have been damaged in the post to make this methods unreliable. Also, charges may often be levied by Russian customs. The opportunity to collector examine specimens <i>in-situ</i> offered by international conferences and the travelling of colleagues is often taken up. |
| Activity | Examine specimens | Broad category representing the examination of specimens |
| Activity | Prepare specimens | Broad category representing the preparation of specimens for examination |
| Action | Extract specimens from substrate | Nematode worms tend to be extracted from the soil sample or other substrate by filtration. The substrate is mixed with water, before suspension over the porous membrane allowing only the nematodes and other very small particles to pass through. The substrate solution can also be mixed with MgSO ₄ ; this compound raises the density of the surrounding fluid to a level at which the animals can be more easily separated from the substrate. Live specimens move, and under the force of gravity the nematodes will pass through the filter themselves. Dead or larger specimens may require the additional force of a centrifuge, though in some cases a centrifuge can be damaging to these delicate creatures. The taxonomist employs a number of different techniques to extract specimens; all rely on the basic principle of filtration however. |

| | | |
|----------|-----------------------------|---|
| | | |
| Decision | Prepare culture? | If the quantity of specimens is not sufficient, a culture can be prepared |
| Action | Prepare culture | Nematodes can also be harvested from culture. This is typically done in a Petri-dish prepared with fungus. A small sample of nematodes placed on this under the right conditions will rapidly multiply, consuming the fungus and providing enough specimens for any examination. Again, there are a number of ways to culture nematodes. |
| Action | Fix slides | The specimens are mounted onto microscope slides, stained with orcein where required, and fixed with glycerine. |
| Action | First visual examination | First visual examination, involves a broad overview of the specimens in order to take in their general characteristics. |
| Action | Sort specimens | Physically sorting the specimens becomes less useful when microscope is required for examination, as the broad overview that sorting provides is not available |
| Action | Detailed visual examination | A more focussed examination, in which the taxonomist focuses on finer, more detailed characters that may distinguish the specimens on the species level. At this stage, computer-aided photography is often employed. Images can be captured from the microscope direct to the computer. Software is used to process the images, and prepare them for digital storage or publication. If high magnification is used, multiple images can be combined to form a larger, high resolution image. Detailed study and the taking of measurements will tend to take place from the images rather than direct from the microscope; software can also |
| Decision | Further analysis? | A decision as to whether further analysis is required. |
| Action | Further analysis | Molecular analysis of specimen is available in the institute, though the taxonomist chooses not to employ these methods himself. |
| Decision | Assess emerging theory | A decision as to whether the emerging taxonomic theory adequately describes the variance seen in the specimens. |
| Activity | Prepare paper | Broad activity referring to the process in which a scientific paper is compiled and published. |
| Action | Compile manuscript | Compile the manuscript, according to the editorial guidelines of the journal, using a word processing |

| | | |
|----------|--|---|
| | | <p>package. Papers will include the standard requirements of a taxonomic review, and also other items such as tables, images, distribution maps, and any other information or analysis appropriate to the study.</p> <p>Images are processed using Adobe Photoshop CS2.</p> |
| Action | Friendly review | An informal review carried out by colleagues prior to any formal submission of the paper. |
| Action | Revise paper | In the light of the reviewer's comments, carry out any revisions to the paper that are felt necessary |
| Action | Submit to journal | Submit the manuscript to the journal in accordance with the editorial guidelines. Now almost always by email. |
| Decision | Manuscript review | <p>The manuscript will be peer-reviewed by a number of independent scientists. The outcome of this review can be:</p> <ul style="list-style-type: none"> - Minor modification - Major modification - outright acceptance (rare) - outright rejection (rare) |
| Activity | Curation activities | |
| Action | Label specimens | Labels are either hand-written, or printed if a large number are required, and glued to the prepared slide. |
| Action | Return loaned specimens / send out paratypes | Loaned specimens tends to be returned by hand when the opportunity arises. |
| Action | Place specimens in local collection | The slides are packaged into boxes and placed in the local collection. Live specimens are also stored in vials, in a medium that allows them to stay alive; barley seeds are commonly used. Such specimens will need to be re-cultured every few years. |
| Action | Update collection database | |
| | | |

Other activities:

Scanning for the digital library

The taxonomist regularly scans papers from the institute library for electronic storage. This is an ongoing project to convert the institute's substantial library into digital format. This work is very often assigned to students.