Evolution and Plant Science, Topical Review at ISTA, February 19-21, 2024

Evaluation Panel
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Joan Strassmann, Washington U, St. Louis, USA,
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EXECUTIVE SUMMARY

Research in evolution and plant sciences at ISTA is internationally leading and showcases discoveries that rewrite textbooks. Excellent new personnel have been recruited and the field of plant epigenetics has added an exciting, and very promising research direction. The tight interplay of theoretical and empirical work (for example by the Barton group but also others) is impressive and a very distinctive strength internationally. Collectively, the group is world class and in several areas it is amongst the world leaders.

Graduate training in the evolution and plant sciences area is very high level and the courses provided by Professors were seen as a clear strength that contributes significantly to excellent scientist training and fosters quantitative thinking. Postdoctoral researchers and PhD students overall appreciated working in a well-funded and intellectually stimulating environment. Infrastructure and facilities at the Institute are overall top notch with the exception of IT, where work needs to be done to reach the level one would hope to see in an institute of such high international standing.

Scientists at all levels do not feel well informed or included in decision making and there are difficulties with and distrust towards the administration. There needs to be regular open communication by leadership with faculty members but also with PhD students and postdocs. Mentoring arrangements at all levels need to be strengthened as detailed in the report. Campus climate could be improved among the above constituents and also with the human resources department.

The substantive projected growth of the Institute until 2035 is an opportunity that poses significant challenges at different levels. It will be important to find mechanisms that foster synergies and develop community spirit and also to make sure that new personnel can be integrated successfully such that new synergies between disciplines can arise. It will also be important to ensure that core facilities are not overwhelmed and are able to support the scientists productively. In a nutshell, growth of the Institute with appointing new investigators in different diverse areas should not lead to neglect of existing groups and facilities. There is also a need for adequate investment in existing groups and structures so that critical mass is maintained. Some periods of pause in hiring might be useful.

New recruitments in evolutionary genetics/ecology as well as plant biology, the latter with a strong focus on single cell approaches, are recommended.

The panel appreciated the openness and engagement of ISTA's president and his commitment to greater communication and transparency between the leadership and administration of the institute and its scientists.

Summary points

Strengths

- Internationally leading activity in both evolution and plant sciences.
- Very strong activity in both experimental and theoretical approaches creates a vibrant and stimulating environment.
- Very strong and distinctive graduate programme.
- Independent junior faculty can follow their vision without interference.
- Core funding allows long term planning of research programmes.

Weaknesses

- Transparency and clarity on decision making processes need developing. Structures that support inclusivity in decision making need to be put in place and there needs to be regular communication of leadership with faculty, postdocs and graduate students.
- There is a pronounced lack of trust of scientists towards the administration. The faculty do not perceive the administration as supporting them.
- Academic interactions between EPS and other parts of the institute could be strengthened.
- There are areas that are at risk of falling below a critical mass, particularly microbiology and evolutionary biology/field population biology.
- Mentorship at all levels, IT support and childcare need strengthening.

General comments

The panel met in person on Feb 19 -21 in Vienna to review the evolution and plant science areas (EPS) of the Institute of Science and Technology Austria. Participating panel members were Andrew Murray (ISTA ScB member), Harvard U, USA; Joan Strassmann, Washington U, St. Louis, USA; Dmitry Filatov, U of Oxford, UK; Vincent Colot, ENS Paris, France; Miltos Tsiantis MPI Köln, Germany who served as Chair.

The evaluation provided in this report is based on:
1. The written report provided electronically to the panel
2. Oral presentations by all Professors
3. Meetings with the Professors, Postdoctoral researchers, and PhD students including a poster session
4. Interviews with individual professors

Prior to commencing the review activities, the board was briefed by Martin Hetzer regarding the mission statement and the administrative and scientific organisation of ISTA. The panel appreciated the energy and ambition with which he leads the ISTA.

The EPS research area comprises approx. 25% of the professors of the life sciences and includes 3 scientists from the ISS (Tkacik, Barton, Guet). The panel was impressed with EPS faculty who present strong evidence for academic excellence underpinned by high

creativity in a wide set of research topics. This is evident in international visibility, high level publications, overall international standing and considerable success in attracting external grants including ERC grants (48% success rate, the highest of all research institutions in Europe). The basic operational principle is that ISTA recruits outstanding group leaders, which drives the continued productivity, scientific discoveries and overall impact. This creates positive feedback, by reinforcing international standing at all levels, which fuels further discoveries. This cycle is empowered by excellent research facilities, scientific support units, and a vibrant graduate school, which, in many ways, is similar to US graduate programmes as it includes participation in taught classes and rotations. Both wet lab and theoretical approaches are pursued in EPS and this is clearly a strength. Cutting-edge research programmes are active and in some cases EPS work has produced important paradigm shifts (plant hormone biology, evolutionary and population genetics, disease ecology). There has clearly been considerable success in the recruitment of international talent as also seen in the plant epigenetics recruits who presented very strong research programmes. This overall strategy of opting to attract outstanding scientists with strong vision for the future rather than strictly thematically is in some ways comparable to the Max Planck Society.

The evolutionary biology groups are well integrated with evidence of joint publications, joint trainee supervision and consequent synergies. The plant development groups also have strong internal synergies. The recently recruited plant epigenetics recruits cover topics which offer potential for synergies broadly in ISTA and the future will show whether interactions can develop organically. There are opportunities for synergy of plant development/epigenetic with other life science groups for example in the area of developmental biology or regulation of gene expression and it would be to the interest of ISTA to explore those further. One possibility is to organize an ad hoc joint retreat to explore possibilities. Similar “subject meeting” days could be used to help stimulate further interactions as ISTA continues to grow. Overall, there is some evidence that joint teaching options also provide a platform for expertise integration between plant and evolutionary groups, which is certainly positive.

One point that was discussed at length was the future of evolutionary biology at ISTA. It is an important and vital area with relatively few faculty. Further, there is an absence of ecology and field biology with the exception of Professor Barton. Exactly how these important areas can be expanded can be solved in a variety of ways but should not be neglected.

Further, Prof. Barton at some point will retire and indicated that he is not going to recruit further students as the main advisor. At the moment the Barton group has a major role in group cohesion as his research is outstanding; it clearly covers both areas (PS and Evolution) and he collaborates very broadly. Additionally, Prof. Barton has for many years had a very strong presence in teaching and a key role in championing quantitative methods and mathematical thinking. His presence has therefore allowed such approaches to develop and permeate several research programmes to a degree that is still unusual for biology departments. His retirement is still some years in the future as Prof. Barton has recently had large external grants funded. Nonetheless it will be a big

change for EPS and ISTA more broadly so some internal discussion is needed to decide how to absorb this change. The committee strongly feels that there is a need for a suitable recruit with recognized leadership skills in the area of plant evolution/studying association of genotypes to phenotypes or other ecology/evolution areas that include field biology. Note that plant diversity/natural variation can also have significant links with projects on disease, ecology and biodiversity as well as monitoring and mitigating the effects of climate change and crop biology, so there are clearly opportunities there.

Regardless of the strategy followed on this front, the continuation and further strengthening of interdisciplinary research will be pivotal for the future success of ISTA including its EPS groups. This can be facilitated by organising discussion days between theoreticians and experimentalists. It could also be stimulated by having dedicated funding streams in the graduate and perhaps postdoc programmes (see for example the EIPOD initiative at EMBL).

A major issue the panel identified is that scientists at all levels felt that decision making structures are opaque and that communication of the rationale underlying decisions is lacking. This situation alienates scientists at all levels. For example, some feel that while leave is given to new parents, the temporary impact on productivity is not appreciated when people are evaluated. There needs to be a concerted effort to make sure that faculty feel that their views are represented and respected. Faculty feel that the administration has too much power and not enough understanding of the needs of the scientists. There needs to be more transparency in decision making. One possibility is to solicit external advice from people with experience in science management e.g., ETH, EMBL. It is clear that the change in leadership has given many ISTA members hope for improvement on these fronts so there is now an opportunity to move forward. In this context the panel strongly recommends that the ISTA president meets regularly with representatives of students and postdocs to discuss current events at the institute, consult with decision-making processes and engage with issues that they are concerned with. We urge ISTA's president to make use of the energy and optimism generated by his arrival to tackle urgently the apparent divide between scientists and ISTA's administration.

While there are objective reasons for rapid growth of the institute there is a risk that this speed might cause difficulties in integrating new faculty members in a way that allows for building true interdisciplinary activity. There is also a risk that the focus on new recruitment results in neglect of existing areas. In this respect it is important to maintain a dialogue with the faculty and consider needs of different areas. Specifically in the area of plant biology that the panel looked at, an appointment with a focus on development/cell biology/regulation of gene expression and exploiting single cell approaches has considerable merit as it would complement and further empower existing strengths in this area. Microbiology/evolutionary biology would also benefit from new appointments, perhaps in areas that interface with disease ecology. Growth of the institute will also need strengthening of mentorship of new group leaders. The panel found that while some mentorship of junior group leaders currently occurs, arrangements seem ad hoc and there is confusion with regard to the demarcation of mentorship and "mid-term evaluation". This point would benefit from open discussion between recent recruits, the leadership, and

more experienced group leaders, with the aim of putting in place structures that help younger group leaders have a rewarding time at ISTA.

The ISTA is distinctive with respect to other similar research institutes internationally in that it offers doctoral degrees. The broad structure of doctoral training mirrors that of leading universities in the US and so is highly distinctive for Europe. Trainees benefit from teaching in the form of lectures by the professors themselves, and the topics provided make the overall training very high level. Thus overall, the ISTA is world leading with very high-end research possibilities and training for PhD students. One aspect that could be strengthened/made more consistent is the operation of thesis advisory committees (TACs), such that they meet with students yearly to evaluate their progress, and help get people back on track if difficulties arise. The TAC should aim to help monitor not only scientific progress, but also student wellbeing, and the graduate office could assist the smooth running of TACs in terms of the associated administrative paperwork. Also, many institutions run TACs such that part of the meeting is without the student, and part is without the main supervisor, which helps identify and suggest solutions to friction or misunderstandings between student and advisor. TACs are in place at ISTA, which is positive; however, the panel felt that they could be more active.

The panel had extensive discussions with postdocs who were enthusiastic about research possibilities and ISTA, but also had some concerns. One issue they raised is the cap on the paid maternity period to 8 months, instead of the one year that is available for graduate students. The panel agreed that this is an important issue that needs to be rectified. Postdocs also expressed a wish to be more strongly engaged in academic life at the institute. The panel suggests that the postdocs are allocated a larger budget to facilitate organisation of scientific workshops and related events. For example, they expressed a strong interest in hosting at ISTA a meeting with their colleagues at the University and Biocluster. Postdocs could also be given the opportunity to nominate and host one speaker annually in the institute seminar series. The postdocs further requested to have more input in the training events organised for them to ensure that they meet their needs. In terms of obtaining broader feedback on their development, it would be good to consider a model where a second group leader acts as an advisor who can provide independent discussion on progress, training and career development. In terms of transparency the postdocs requested more clarity and timely information on the type of funding they are allowed to apply for, and flexibility in their ability to apply for their own fellowships such as for example the Esprit. They also requested increased sensitivity with respect to the instalments in which they get their contracts, particularly for non-EU scientists where practicalities become difficult (e.g., visa applications, renting accommodation, bank loans). These issues will benefit from clear communication between leadership, administration and the postdoc association.

An important part of the ISTA are Scientific Service Units (SSUs) which support different aspects of science and often participate in innovations such as the vertical microscope. The planned growth of the institute may stretch the core facilities, so it is advisable to develop a concrete plan for their development. Given the importance and potential of these units, ISTA should consider a coordinated evaluation of the SSUs. In some cases,

it was felt that SSU personnel were insufficiently qualified to meet faculty needs and that this problem could be at least partly addressed by hiring unit managers at PhD level.

In terms of diversity, the panel found a healthy gender balance and a highly international cohort of scientists at all levels. It is important that mechanisms to support female students and postdocs are strengthened to prevent the international trend of losing diversity in more senior positions. This can involve proactive mentoring programmes at all levels and concrete measures to support female scientists, who often bear the brunt of domestic tasks; for the latter, the following URL link can provide some inspiration: https://cnv-stiftung.de/en/goals. Building strong childcare opportunities for scientists at all levels is an important component of this strategy and the panel was pleased to see plans for expanding the kindergarten. The panel also heard a lot of complaints on standards of childcare. It seems that more investment in this area is needed and it is important that this situation is resolved. It would also be good to help support childcare requests at least at group leader levels perhaps through strengthening the international office. Last, but not least, care needs to be taken when recruiting female scientists to ensure that recruitment conditions are equitable and appropriately reflect their achievement and potential.

Day to day IT support is an important aspect of institute activity. Here, scientists felt that there is a lot of work to be done with a common perception being that IT is understaffed and facing challenges to meet scientists' requests in a timely fashion.

Science remains a competitive enterprise. The fast pace and increasing demands for publication, attracting funds and career progression, create considerable pressure for academics at all levels. It is therefore important that an institutional strategy exists to prevent this, and to foster excellence within a rewarding work environment, with gender balance and inclusiveness of diversity. This requires continuous development of mentoring strategies. Procedures for dealing with non-scientific misconduct/ harassment/bullying were not detailed in the report. It is important that those are in place and clearly communicated to everyone as this helps to create an inclusive environment. The panel was very positive about participation in the BRIDGE network, which provides important opportunities for sharing expertise in running top level research institutes. Participation is also beneficial to secure funding for joint recruitment and improved training for postdocs and PhD students. In this regard, participation in https://eu-life.eu might be explored to strengthen presence in the European research area.

Technology transfer is covered by Xista innovation, a GmbH (company with limited liability) that was created with this purpose. Information on whether the EPS scientists have participated in such activities was not provided -there could be opportunities there.

The panel suggests that in the future the group leader reports are more streamlined to clearly indicate work, publications, awards and prizes specifically in the reporting period after a brief introduction. This will help the panel to evaluate the trajectories of the different research groups. It may also provide opportunities for younger group leaders to position projects in the context of potential future grant applications. Finally, the panel would like

to thank all scientists who participated in the evaluation for the work they put in their reports and presentations and for their willingness to discuss openly their research, as well as other points relating to ISTA function.