

DOIs for “Non-Traditional” Objects and Creating Linkages Between Objects with DOIs

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Office of Scientific and Technical Information



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Non-Traditional Objects

First, let's talk about common objects that have DOIs assigned:

Through Data ID Service

- Datasets and Data Collections

Outside Data ID Service

- Journal Articles/AMs
- Software
- Technical Reports

Second, but what about other objects?

These may be...

- Supplemental Information
- Proposals or Awards
- Instruments
- And? Others?



Client Examples



- Current Data ID clients are thinking about other types of objects to assign DOIs for their individual use cases, and may serve as examples for other Data ID clients to consider when thinking about ways to assign DOIs.
- For example:
 - Atmospheric Radiation Measurement (ARM) – **Instruments**
 - Environmental Molecular Sciences Laboratory (EMSL) – **Awards and Instruments**
 - Joint Genome Institute (JGI) – **Awards/Project level**
 - The “Facilities Integrating Collaborations for User Science” (FICUS) – Collaboration between JGI and EMSL – **Award level**
 - Department of Energy Systems Biology Knowledgebase (KBase) – **Narratives**



Ways we Link Objects

- We interlink objects using the “related identifiers” metadata fields and these relationships are provided by E-Link, SCHOLIX and Crossref.
- We also show relationships from Web of Science, but these relationships are only made available to DOE community users because of our agreement with Web of Science.
- Existing use cases include linking between:
 - ❖ Datasets
 - ❖ Journal articles
 - ❖ Patents
 - ❖ Technical Reports

**Examples of linkages will be shown here in OSTI.GOV, but later Sara will show more examples in DDE.*



Linking Objects in E-Link

The screenshot displays the E-Link web application interface. At the top left is the E-Link logo with the text 'OFFICE OF SCIENTIFIC AND TECHNICAL INFORMATION'. At the top right is the U.S. Department of Energy logo. Below the logos is a navigation menu with links: Home, About, FAQ, Submit STI, Announcement Notices, Authorities, Contact Us, and Site Map. The main heading reads 'United States Department of Energy Energy Link System (E-Link) DOE STI Management System'. On the left side, there is a vertical menu with buttons for: 1. Product Description, 2. Product Type Info, 3. Authors, 4. Content, 5. Related Documents (highlighted in blue), 6. Contact Info, 7. Upload/Link, 8. Certifications, and 9. Summary. The main content area is titled 'Related Documents' and contains a section for 'Related Document Information ?' with a text input field. Below this is a section for 'Add/Remove Related Identifiers/DOIs ?' with explanatory text. At the bottom of this section, there is a table-like structure for 'This STI product (Item A)' with a dropdown menu set to 'IsSupplementedBy', a text input field for 'DOI', and a red 'Delete' button. A green '+ Add Another' button is located below the table.

- STI Products may be linked in E-Link to objects using "Add/Remove Related Identifiers/DOIs."
- Objects may be related by selecting from a list of 31 **DataCite Relation Types** (see handout) and then by entering the DOI for that object.



Examples of Current Linkages in the OSTI.GOV Display

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OSTI.GOV / Search for rumen metagenome (filtered) / Journal Article: Rumen metagenome and metatranscriptome analyses of low methane yield sheep reveals a *Sharpea*-enriche...

Rumen metagenome and metatranscriptome analyses of low methane yield sheep reveals a *Sharpea*-enriched microbiome characterised by lactic acid formation and utilisation

Full Record **References (47)** Cited by (41) Reference / Citation Traversal Other Related Research

JOURNAL ARTICLE:
Free Publicly Available Full Text
Accepted Manuscript (DOE)
Publisher's Version of Record
DOI: 10.1186/s40168-016-0201-2
Copyright Statement

OTHER AVAILABILITY
Search WorldCat to find libraries that may hold this journal

CITATION METRICS:
Cited by: 41
Impact Factor: 9.133
Citation Impact by Journal: 1.73
Citation Impact by Field: 4.89
% Rank by Field / Year: 1.92
Citation information provided by Web of Science

Abstract

Enteric fermentation by farmed ruminant animals is a major source of methane and constitutes the second largest anthropogenic contributor to global warming. Reducing methane emissions from ruminants is needed to ensure sustainable animal production in the future. Methane yield varies naturally in sheep and is a heritable trait that can be used to select animals that yield less methane per unit of feed eaten. We previously demonstrated elevated expression of hydrogenotrophic methanogenesis pathway genes of methanogenic archaea in the rumens of high methane yield (HMY) sheep compared to their low methane yield (LMY) counterparts. Methane production in the rumen is strongly connected to microbial hydrogen production through fermentation processes. In this study, we investigate the contribution that rumen bacteria make to methane yield phenotypes in sheep. Using deep sequence metagenome and metatranscriptome datasets in combination with 16S rRNA gene amplicon sequencing from HMY and LMY sheep, we show enrichment of lactate-producing *Sharpea* spp. in LMY sheep bacterial communities. Increased gene and transcript abundances for sugar import and utilisation and production of lactate, propionate and butyrate were also observed in LMY animals. *Sharpea azabuensis* and *Megasphaera* spp. act as important drivers of lactate production and utilisation according to phylogenetic analysis and [more >](#)

Authors: Kamke, Janine ^[1]; Kittelmann, Sandra ^[1]; Soni, Priya ^[1]; Li, Yang ^[1]; Tavendale, Michael ^[1]; Ganesh, Siva ^[1]; Janssen, Peter H. ^[1]; Shi, Weibing ^[2]; Froula, Jeff ^[2]; Rubin, Edward M. ^[2]; Attwood, Graeme T. ^[1]

+ Show Author Affiliations

- Many linkages may be seen for Accepted Manuscripts/Journal Articles, but linkages to other STI exist.
- Relationship types may include References, Cited by, and Supplement To...
- Some of the References and Cited by relationships are only available for DOE community users as well as Reference/Citation Traversal.



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OSTI.GOV / Journal Article: *Rumen metagenome and metatranscriptome analyses of low methane yield sheep reveals a *Sharpea*-enriched microbiome characterised by lactic acid fo...*

Rumen metagenome and metatranscriptome analyses of low methane yield sheep reveals a *Sharpea*-enriched microbiome characterised by lactic acid formation and utilisation

Full Record References (47) Cited by (41) Reference / Citation Traversal **Other Related Research**

Similar Records Other Research related to this record:

Related Works >

- Collection (1)
- Dataset (13)
- Figure (4)
- Preprint (1)

[Rumen metagenome and metatranscriptome analyses of low methane yield sheep reveals a *Sharpea*-enriched microbiome characterised by lactic acid formation and utilisation \[Supplemental Data\]](#)

DATASET, OCTOBER 2016
Kamke, Janine; Kittelmann, Sandra; Soni, Priya
figshare-Supplementary information for journal article at DOI: 10.1186/s40168-016-0201-2, 17 files
DOI: 10.6084/m9.figshare.c.3624278

This dataset is a supplement to the current record

[Rumen metagenome and metatranscriptome analyses of low methane yield sheep reveals a *Sharpea*-enriched microbiome characterised by lactic acid formation and utilisation \[Supplemental Data\]](#)

COLLECTION, OCTOBER 2016
Kamke, Janine; Kittelmann, Sandra; Soni, Priya
Figshare-Supplementary information for journal article at DOI:, 17 files
DOI: 10.6084/m9.figshare.c.3624278.v1

Search

Sort by title
 Sort by date
[\[x clear filter / sort \]](#)

Journal Article

- From the Full Record page, additional linkages (outside of the References and Cited By relationship types) are displayed by navigating to the **Other Related Research** tab at top of the **Full Record** page, under **Related Works**.
- The # of related works and their type can be accessed by clicking on the type of work.





Rumen metagenome and metatranscriptome analyses of low methane yield sheep reveals a *Sharpea*-enriched microbiome characterised by lactic acid formation and utilisation

[Full Record](#) [References \(47\)](#) [Cited by \(41\)](#) [Referen](#)

Specific microbiome-dependent mechanisms underlie the energy har...
Ben Shabat, Sheerli Kruger; Sasson, Goor; Doron-Faigenboim, Adi
DEC 2016 – ISME JOURNAL

Rumen metagenome and metatranscriptome analyses of low methane yield sheep reveals a *Sharpea*-enriched microbiome characterised by lactic acid formation and utilisation

[Full Record](#) [References \(47\)](#) [Cited by \(41\)](#)

Microbiota of the Gut-Lymph Node Axis: Depletion of Mucosa-Associated Colistin Sulfate and Linco-Spectin in Pigs
Zwirzitz, Benjamin; Pinior, Beate; Metzler-Zebeli, Barbara
APR 11 2019 – FRONTIERS IN MICROBIOLOGY

The diverse and extensive plant polysaccharide degradative activity of rumen microorganisms
Accetto, Tomaz; Avgustin, Gorazd
MAR 2019 – SYSTEMATIC AND APPLIED MICROBIOLOGY

Ruminal methane production: Associated microorganisms and the potential of applying nitrogen-fixing bacteria for mitigation
Lan, Wei; Yang, Chunlei
MAR 1 2019 – SCIENCE OF THE TOTAL ENVIRONMENT

Comparative metagenomic and metatranscriptomic analyses reveal the breed effect on the rumen microbiome and its associations with feed efficiency in beef cattle
Li, Fuyong; Hitch, Thomas C. A.; Chen, Yanhong
JAN 14 2019 – MICROBIOME



Rumen metagenome and metatranscriptome analyses of low methane yield sheep reveals a *Sharpea*-enriched microbiome characterised by lactic acid formation and utilisation

[Full Record](#) [References \(47\)](#) [Cited by \(41\)](#) [Reference / Citation Traversal](#) [Other Related Research](#)

REFERENCES: 47

Specific microbiome-dependent mechanisms underlie the energy harvest in sheep
Ben Shabat, Sheerli Kruger; Sasson, Goor; Doron-Faigenboim, Adi
ISME JOURNAL 2016

Remote Control by Inter-Enzyme Allostery: A Novel Mechanism of Enzyme Regulation
Munack, Steffi; Roderer, Kathrin; Okvist, Mats
JOURNAL OF MOLECULAR BIOLOGY 2016

Bovine Host Genetic Variation Influences Rumen Microbiome Composition
Roehe, Rainer; Dewhurst, Richard J.; Duthie, Carol-Anne
PLOS GENETICS 2016

The rumen microbial metagenome associated with methane production in sheep
Wallace, R. John; Rooke, John A.; McKain, Nest
BMC GENOMICS 2015

Rumen metagenome and metatranscriptome analyses of low methane yield sheep reveals a *Sharpea*-enriched microbiome characterised by lactic acid formation and utilisation
Kamke, Janine; Kittelmann, Sandra; Soni, Anshu
MICROBIOME 2016

Accepted Manuscript (DOE)

10.1186/s40168-016-0201-2

< 47 references

41 citing articles >

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Microbiota of the Gut-Lymph Node Axis: Depletion of Mucosa-Associated Colistin Sulfate and Linco-Spectin in Pigs
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SCIENCE OF THE TOTAL ENVIRONMENT 2019

Comparative metagenomic and metatranscriptomic analyses reveal the breed effect on the rumen microbiome and its associations with feed efficiency in beef cattle
Li, Fuyong; Hitch, Thomas C. A.; Chen, Yanhong
MICROBIOME 2019

References, Cited by, and Citation Traversal

- Some linkages and relationships are provided through an agreement with Web of Science – these include References and Cited By.
- Using the References and Cited By relationships from Web of Science, we create a display to quickly show and explore those relationships called Reference/Citation Traversal.
- The Web of Science relationships are only available to the DOE community because of our Web of Science agreement.



Examples of Current Linkages and the OSTI.GOV Display

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Dataset

- Shows linkages for the Dataset to References and Cited by.

OSTI.GOV / Dataset: Public Data Set: Advancing Local Helicity Injection for Non-Solenoidal Tokamak Startup

Public Data Set: Advancing Local Helicity Injection for Non-Solenoidal Tokamak Startup

Full Record

DATASET:

View Dataset

DOI: 10.18138/14897

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OSTI.GOV / Search for advancing local helicity (filtered) / Dataset: Public Data Set: Advancing Local Helicity Injection for Non-Solenoidal Tokamak Startup

Public Data Set: Advancing Local Helicity Injection for Non-Solenoidal Tokamak Startup

OSTI.GOV / Dataset: Public Data Set: Advancing Local Helicity Injection

Public Data Set: Advancing Local Helicity Injection for Non-Solenoidal Tokamak Startup

Full Record References (5) Cited by (8) Other Related Research

Full Record References (5) Cited by (8)

All References

Journal (5)

Search

- Sort by title
- Sort by date

[x clear filter / sort]

All Cited By

Journal (8)

Search

- Sort by title
- Sort by date

[x clear filter / sort]

Works referenced in

Continuous, edge-localized mode and sustainment of high performance tokamak plasmas

JOURNAL, MAY 2017

Burke, M. G.; Barr, J. L.; Bongard, M. W.; Barr, J. L.

Nuclear Fusion, Vol. 57, Issue 7, Article No. 076010

DOI: 10.1088/1741-4326/aa6f2b

Works referencing / citing this record:

H-mode plasmas at very low aspect ratio on the Pegasus Toroidal Experiment

JOURNAL, SEPTEMBER 2016

Thome, K. E.; Bongard, M. W.; Barr, J. L.

Nuclear Fusion, Vol. 57, Issue 2, Article No. 022018

DOI: 10.1088/0029-5515/57/2/022018



Linking Reports

The screenshot shows the OSTI.GOV website interface. At the top, there is a search bar and navigation links. The main content area displays a technical report titled "Brochure on In Situ Data Management". Below the title, there are two tabs: "Full Record" and "Other Related Research". The "Other Related Research" tab is highlighted with a red box. Under this tab, there is a section for "Other Research related to this record:" which includes a link to "Workshop report on In Situ Data Management". Below this link, there is a "Related Works" section with a "Report (1)" link, also highlighted with a red box. The page footer includes the text "The current record is a supplement to this report".

- A recent case came up where EERE and SC had a need to link a technical report to other reports, e.g., workshop or lab reports where the technical report was referenced, and they wanted to make the association by linking the objects.
- Using DOIs, this can be done easily to associate the reports to the main technical report record.



Workshop Discussion Questions

- Feedback on “Related Identifiers” field— Are you using related identifiers? Who is using it and why, and why it might not be used?
- If you are using the related identifiers, where in the workflow are you using the function? Afterthought or is it a part of your process when you enter metadata?
- What other ways are you linking research outputs?
- What other ways can we get this linking information? What other ways could we display the information that would be useful?
- Would you or your organization benefit from showing the relationships among authors, award numbers, site, etc?

