

## EXPERIMENTAL - bloxberg Blockchain ?

Certification of metadata file on the bloxberg blockchain

Internal JSON External JSON

Dataset: FRIM - Fruit Integrative Modelling

bloxberg Server URL:

<https://certify.bloxberg.org/>

Wallet bloxberg:

0xC604ffa8adE14dc9A22B6B19bdFC07E489156E53

API bloxberg:

0x1234567890123456789012345678901234567890

Publish

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API bloxberg:

0x00

Publish

1

▶ Metadata file

▶ bloxberg metadata

▶ bloxberg query

👁 META\_frim1.json

👁 bloxberg\_metadata\_frim1.json

👁 bloxberg\_query\_frim1.json



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- ▶ Metadata file
  - ▶ bloxberg metadata
  - ▶ bloxberg query
- 👁 META\_frim1.json
  - 👁 bloxberg\_metadata\_frim1.json
  - 👁 bloxberg\_query\_frim1.json

## Metadata File

```
{
  "profile": "https://pmb-bordeaux.fr/maggot/conf/maggot-schema.json",
  "title": "frim1",
  "fulltitle": "FRIM - Fruit Integrative Modelling",
  "license": "Etalab V2.0 license",
  "depositor": "Jacob Daniel",
  "publication_idnumber": "10.1104/pp.113.231241",
  "publication_url": "https://doi.org/10.1104/pp.113.231241",
  "description": "The project aimed to build a virtual tomato fruit that enables the prediction of metabolite levels given genetic and environmental inputs, by an iterative process between laboratories which combine expertise in fruit biology, ecophysiology, theoretical and experimental biochemistry, and biotechnology.",
  "publication_citation": "Biais B, Bénard C, Beauvoit B, Colombié S, Prodhomme D, Ménard G, Bernillon S, Gehl B, Gautier H, Ballias P, Mazat J-P, Sweetlove L, Génard M, Gibon Y. 2014. Remarkable reproducibility of enzyme activity profiles in tomato fruits grown under contrasting environments provides a roadmap for studies of fruit metabolism. Plant Physiology 164, 1204-1221",
  "status": "Processed",
  "access_rights": "Public",
  "publication_idtype": "doi",
  "contacts": [
    "Gibon Yves"
  ],
  "authors": [
    "Bénard Camille",
    "Biais Benoit",
    "Beauvoit Bertrand",
    "Colombié Sophie"
  ],
  "collectors": [
    "Bénard Camille",
    "Biais Benoit",
    "Ballias Patricia",
    "Maucourt Mickaël"
  ],
  "curators": [
    "Moing Annick",
    "Jacob Daniel"
  ],
  "leader": [
    "Gibon Yves"
  ],
  "wpleader": [
    "Vercambre Gilles"
  ],
  "producer": [
    "Bordeaux Metabolome"
  ]
}
```

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API bloxberg:

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Publish

1

- ▶ Metadata file   META\_frim1.json
- ▶ bloxberg metadata  bloxberg\_metadata\_frim1.json
- ▶ bloxberg query  bloxberg\_query\_frim1.json

## Metadata of the Metadata File

```
{
  "@context": {
    "dc": "http://purl.org/dc/terms/"
  },
  "@type": "Dataset",
  "dc:creator": "https://orcid.org/0000-0001-8161-1089",
  "dc:language": "en",
  "dc:format": "application/json",
  "dc:title": "FRIM - Fruit Integrative Modelling",
  "dc:subject": "https://id.loc.gov/authorities/subjects/sh96000740",
  "dc:date": "2023-11-27T16:17:11.3629640Z",
  "dc:description": "The project aimed to build a virtual tomato fruit that enables the prediction of metabolite levels given genetic and environmental inputs, by an iterative process between laboratories which combine expertise in fruit biology, ecophysiology, theoretical and experimental biochemistry, and biotechnology.",
  "dc:publisher": [
    "https://ror.org/00ccdp17"
  ],
  "dc:rights": "http://spdx.org/licenses/CC-BY-NC-SA-4.0.json",
  "dc:identifier": {
    "@value": "https://pmb-bordeaux.fr/maggot/metadata/frim1?format=maggot",
    "@type": "http://purl.org/dc/terms/URI"
  }
}
```

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0xC604ffa8adE14dc9A22B6B19bdFC07E489156E53

#### API bloxberg:

0xC604ffa8adE14dc9A22B6B19bdFC07E489156E53

Publish

1

▶ Metadata file

👁 META\_frim1.json

▶ bloxberg metadata

👁 bloxberg\_metadata\_frim1.json

▶ bloxberg query

👁 bloxberg\_query\_frim1.json

## Metadata of the Metadata File

```
{
  "@context": {
    "dc": "http://purl.org/dc/terms/"
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  "@type": "Dataset",
  "dc:creator": "https://orcid.org/0000-0001-8161-1089",
  "dc:language": "en",
  "dc:format": "application/json",
  "dc:title": "FRIM - Fruit Integrative Modelling",
  "dc:subject": "https://id.loc.gov/authorities/subjects/sh96000740",
  "dc:date": "2023-11-27T16:17:11.3629640Z",
  "dc:description": "The project aimed to build a virtual tomato fruit that enables the prediction of metabolite levels given genetic and environmental inputs, by an iterative process between laboratories which combine expertise in fruit biology, ecophysiology, theoretical and experimental biochemistry, and biotechnology.",
  "dc:publisher": [
    "https://ror.org/00ccpdp17"
  ],
  "dc:rights": "http://spdx.org/licenses/CC-BY-NC-SA-4.0.json",
  "dc:identifier": {
    "@value": "https://pmb-bordeaux.fr/maggot/metadata/frim1?format=maggot",
    "@type": "http://purl.org/dc/terms/URI"
  }
}
```

## Request

```
{
  "publicKey": "0xC604ffa8adE14dc9A22B6B19bdFC07E489156E53",
  "crid": [
    "ae008cc8ebd20834befa9442db0e59d53effe5ba6cbb8612f9544f8be2fec2b0"
  ],
  "cridType": "sha2-256",
  "enableIPFS": false,
  "metadataJson": "{ \"@context\": { \"dc\": \"http://purl.org/dc/terms/\" }, \"@type\": \"Dataset\", \"dc:creator\": \"https://orcid.org/0000-0001-8161-1089\", \"dc:language\": \"en\", \"dc:format\": \"application/json\", \"dc:title\": \"FRIM - Fruit Integrative Modelling\", \"dc:subject\": \"https://id.loc.gov/authorities/subjects/sh96000740\", \"dc:date\": \"2023-11-27T16:17:11.3629640Z\", \"dc:description\": \"The project aimed to build a virtual tomato fruit that enables the prediction of metabolite levels given genetic and environmental inputs, by an iterative process between laboratories which combine expertise in fruit biology, ecophysiology, theoretical and experimental biochemistry, and biotechnology.\", \"dc:publisher\": [\"https://ror.org/00ccpdp17\"], \"dc:rights\": \"http://spdx.org/licenses/CC-BY-NC-SA-4.0.json\", \"dc:identifier\": { \"@value\": \"https://pmb-bordeaux.fr/maggot/metadata/frim1?format=maggot\", \"@type\": \"http://purl.org/dc/terms/URI\" } }"
```



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0xC604ffa8adE14dc9A22B6B19bdFC07E489156E53

API bloxberg:

0x00

Publish

1

- ▶ Metadata file
- ▶ bloxberg metadata
- ▶ bloxberg query

- 👁 META\_frim1.json
- 👁 bloxberg\_metadata\_frim1.json
- 👁 bloxberg\_query\_frim1.json

## Metadata of the Metadata File

```
{
  "@context": {
    "dc": "http://purl.org/dc/terms/"
  },
  "@type": "Dataset",
  "dc:creator": "https://orcid.org/0000-0001-8161-1089",
  "dc:language": "en",
  "dc:format": "application/json",
  "dc:title": "FRIM - Fruit Integrative Modelling",
  "dc:subject": "https://id.loc.gov/authorities/subjects/sh96000740",
  "dc:date": "2023-11-27T16:17:11.3629640Z",
  "dc:description": "The project aimed to build a virtual tomato fruit that enables the prediction of metabolite levels given genetic and environmental inputs, by an iterative process between laboratories which combine expertise in fruit biology, ecophysiology, theoretical and experimental biochemistry, and biotechnology.",
  "dc:publisher": [
    "https://ror.org/00ccpdp17"
  ],
  "dc:rights": "http://spdx.org/licenses/CC-BY-NC-SA-4.0.json",
  "dc:identifier": {
    "@value": "https://pmb-bordeaux.fr/maggot/metadata/frim1?format=maggot",
    "@type": "http://purl.org/dc/terms/URI"
  }
}
```

Same as

Hash sha256

```
{
  "publicKey": "0xC604ffa8adE14dc9A22B6B19bdFC07E489156E53",
  "crid": [
    "ae008cc8ebd20834befa9442db0e59d53effe5ba6cbb8612f9544f8be2fec2b0"
  ],
  "cridType": "sha2-256",
  "enableIPFS": false,
  "metadataJson": "{ \"@context\": { \"dc\": \"http://purl.org/dc/terms/\" }, \"@type\": \"Dataset\", \"dc:creator\": \"https://orcid.org/0000-0001-8161-1089\", \"dc:language\": \"en\", \"dc:format\": \"application/json\", \"dc:title\": \"FRIM - Fruit Integrative Modelling\", \"dc:subject\": \"https://id.loc.gov/authorities/subjects/sh96000740\", \"dc:date\": \"2023-11-27T16:17:11.3629640Z\", \"dc:description\": \"The project aimed to build a virtual tomato fruit that enables the prediction of metabolite levels given genetic and environmental inputs, by an iterative process between laboratories which combine expertise in fruit biology, ecophysiology, theoretical and experimental biochemistry, and biotechnology.\", \"dc:publisher\": [\"https://ror.org/00ccpdp17\"], \"dc:rights\": \"http://spdx.org/licenses/CC-BY-NC-SA-4.0.json\", \"dc:identifier\": { \"@value\": \"https://pmb-bordeaux.fr/maggot/metadata/frim1?format=maggot\", \"@type\": \"http://purl.org/dc/terms/URI\" } }"
```

## Request

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0xC604ffa8adE14dc9A22B6B19bdFC07E489156E53

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0x1234567890123456789012345678901234567890

Publish

2

- ▶ Metadata file   META\_frim1.json
- ▶ bloxberg metadata  bloxberg\_metadata\_frim1.json
- ▶ bloxberg query  bloxberg\_query\_frim1.json
- ▶ bloxberg response  bloxberg\_response\_frim1.json

```
[
  {
    "@context": [
      "https://www.w3.org/2018/credentials/v1",
      "https://w3id.org/bloxberg/schema/research_object_certificate_v1"
    ],
    "type": [
      "VerifiableCredential",
      "BloxbergCredential"
    ],
    ...
    "proof": {
      "type": "MerkleProof2019",
      "created": "2023-10-31T08:18:52.993006",
      "proofValue": "z7veGuiqoKR3A5A6VJKrNwcowzhzPvSz9MSMz8661R7iJ1FtnmVUbSJLwna4b9f4MNsJ634P7m51PW
KYmUhEowJFpyuYDBmx3AT8bFYP3cQ22kDea7gTYiLRdPtVApGUDwDg86MwozSE4o76FhFDWUKnTetca5f63Gebifrk8S9
Ro1B4yN4Qx7PRqTPESaiUadffofXiwbxtTiQ7ipTQPuk5auhJbt1S4wCj3ELaFL4pYozYBUPVrNjgFWiVQxeTHR1NBqh
C9JHxmrJfkuXJvL15aJEHwW2XhE86zYuKHuSPmUrCm8",
      "proofPurpose": "assertionMethod",
      "verificationMethod": "ecdsa-koblitz-pubkey:0xD748BF41264b906093460923169643f458DbC32e",
      "ens_name": "mpd1.berg"
    }
  }
]
```

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0xC604ffa8adE14dc9A22B6B19bdFC07E489156E53

API bloxberg:

[https://api.bloxberg.org/](#)

Publish

2

▶ Metadata file

▶ bloxberg metadata

▶ bloxberg query

▶ bloxberg response

👁 META\_frim1.json

👁 bloxberg\_metadata\_frim1.json

👁 bloxberg\_query\_frim1.json

👁 bloxberg\_response\_frim1.json

```
[
  {
    "@context": [
      "https://www.w3.org/2018/credentials/v1",
      "https://w3id.org/bloxberg/schema/research_object_certificate_v1"
    ],
    "type": [
      "VerifiableCredential",
      "BloxbergCredential"
    ],
    "proof": {
      "type": "MerkleProof2019",
      "created": "2023-10-31T08:18:52.993006",
      "proofValue": "z7veGuiqoKR3AS5A6VJKrNwcowzhzPvSz9MSMz8661R7iJ1FtnmVUbSjLwna4b9f4MNsJ634P7m51PWKYmUhEowJFpyuYDBmx3AT8bFYP3cQ22kDea7gTYiLRdPtVAgpUDwDg86MwozSE4o76FhFDWkUKnTetca5f63Gebifrk8S9Ro1B4yN4Qx7F7PRqTPESaiUadffofXiwbxtTiQ7ipTQPuk5auhJbt1S4wCj3ELaFL4pYozYBUPVrNjgFWiVQxeTHR1NBqhC9JHxmrJfkuXJvL15aJEHwW2XhE86zYuKHuSPmUrCm8",
      "proofPurpose": "assertionMethod",
      "verificationMethod": "ecdsa-koblitz-pubkey:0xD748BF41264b906093460923169643f458DbC32e",
      "ens_name": "mpd1.berg"
    }
  }
]
```

### Proof of Authority

Transactions and blocks are validated by approved accounts, known as validators.

However the process is automated and does not require validators to be constantly monitoring their computers.

[https://en.wikipedia.org/wiki/Proof\\_of\\_authority](https://en.wikipedia.org/wiki/Proof_of_authority)



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Publish

3

- |                        |                                  |
|------------------------|----------------------------------|
| ▶ Metadata file        | 👁 META_frim1.json                |
| ▶ bloxberg metadata    | 👁 bloxberg_metadata_frim1.json   |
| ▶ bloxberg query       | 👁 bloxberg_query_frim1.json      |
| ▶ bloxberg response    | 👁 bloxberg_response_frim1.json   |
| ▶ bloxberg certificate | 👁 bloxberg_certificate_frim1.zip |

Success : the metadata file has been certified on the bloxberg blockchain  
Download the ZIP which contains the corresponding certificate as a PDF file

```
[
  {
    "@context": [
      "https://www.w3.org/2018/credentials/v1",
      "https://w3id.org/bloxberg/schema/research_object_certificate_v1"
    ],
    "type": [
      "VerifiableCredential",
      "BloxbergCredential"
    ],
    "proof": {
      "type": "MerkleProof2019",
      "created": "2023-10-31T08:18:52.993006",
      "proofValue": "z7veGuIqpKR3ASSA6VJKrNwcowzhzPvSz9MSMz8661R7iJ1FtnmVubSJJLwna4b9f4fNsJ634P7m51PW
KYmUhEowJfPyuYDBmx3AT8bFYP3cQ22kDea7gTYiLRdPtVApGUDwDg86MwozSE4o76FhFDwKUKnTetca5f63GebifrkS9
Ro1B4yN4QxF7PRqTPESaiUadffofXiwbxtTiQ7ipTPuk5auhJbt1S4wCj3ELaFL4pYozYBUPVrNjgFwiVQxeTHR1N8qh
C9JHxmrJfkuXjVl15aJEHwW2XhE86zYuKHuSPmUrCm8",
      "proofPurpose": "assertionMethod",
      "verificationMethod": "ecdsa-koblitz-pubkey:0xD748BF41264B906093460923169643f458DbC32e",
      "ens_name": "mpdl.berg"
    }
  }
]
```

